

National Weather Service and Volunteer Weather Spotters

Working Together to Protect Lives and Property



National Weather Service

Phoenix, Arizona

weather.gov/phoenix





Working Together to Protect Lives and Property

What You'll Learn from this Training

- **NWS Services and Information Sources**
- **How to Recognize Hazardous Weather in Your Community**
- **How to Report These Conditions**





Who Are We?

The National Weather Service

- **Federal Agency**
 - 122 local forecast offices spread across the 50 states and territories
 - 13 River Forecast Centers
 - 9 national centers





Working Together to Protect Lives and Property

National Weather Service

- **Our Mission**

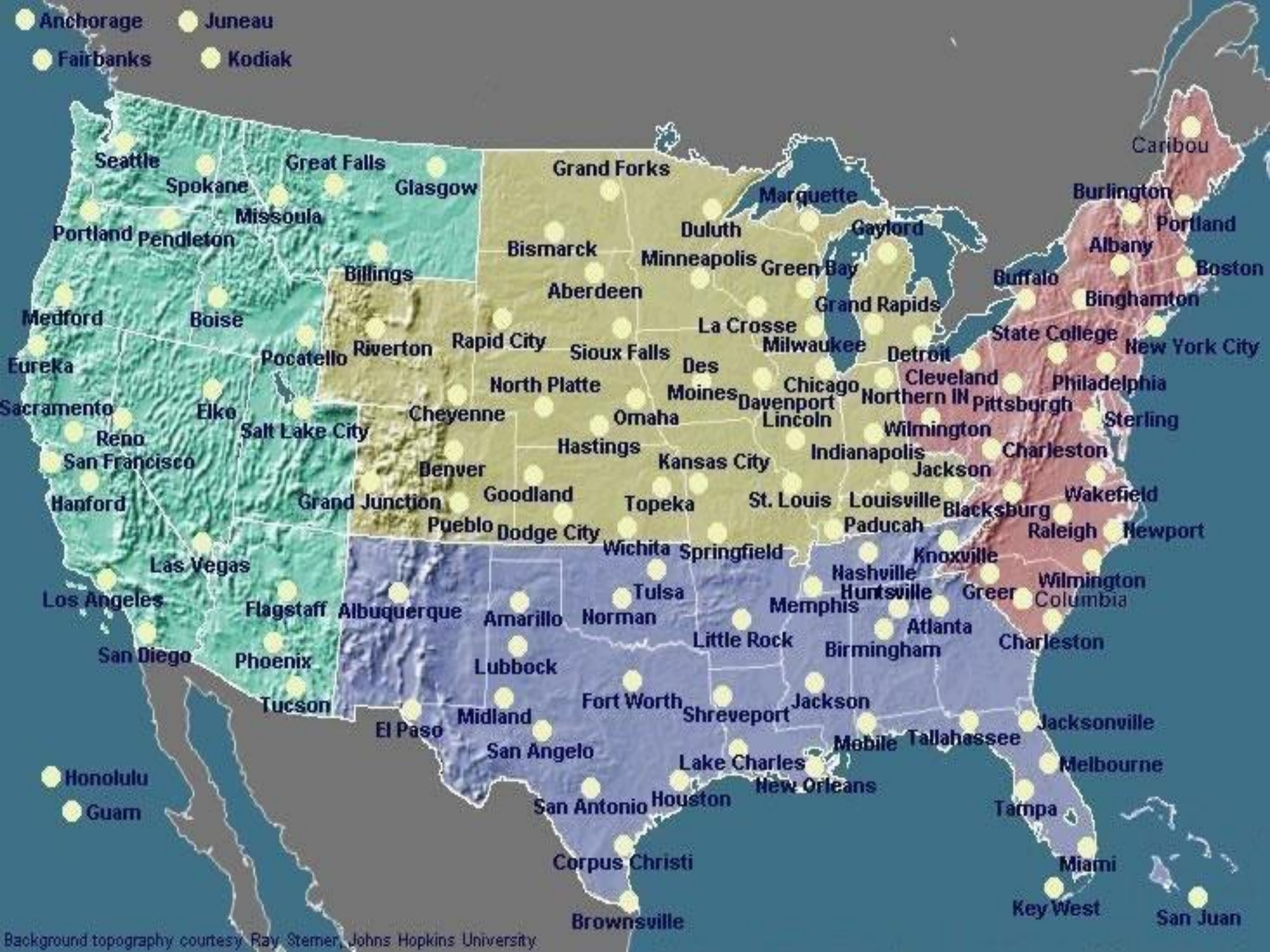
- *To provide accurate and timely weather, water, hydrologic, and climate forecasts, warnings, and watches*

- **For protection of lives and property**
 - **For enhancement of the economy**

- **Strategic goal: Weather Ready Nation**

- Ensure communities are “Ready, Responsive and Resilient” in the face of extreme weather, water and climate events.





National Weather Service Offices in Arizona



NWS Las Vegas

NWS Flagstaff

**NWS
San Diego**

NWS Phoenix

NWS Tucson



NWS Local Forecast Office Services



- Hazardous Weather
 - *Warnings, Watches, Advisories*
- 7 day Weather Forecasts (text and graphics)
- Aviation
 - *Airlines, Traffic Controllers, Private Pilots*
- Fire Weather
 - *Array of forecasts for land mgmt. agencies*
- Emergency Management
 - *HazMat, Event briefings, Exercises*
- Hydrological
 - *Water Supply Outlooks, River Stage Forecasts*
- 24/7/365





NWS Hazardous Weather Forecasts



"Ready, Go!"

- **WATCH** — Conditions are favorable for a severe weather event in the near future (2 hours up to 48 hours)
- **WARNING** — Life or property threatening weather is occurring or imminent ("Severe")
- **ADVISORY** — Weather is occurring or imminent that will cause significant inconvenience and if caution is not exercised conditions could pose a threat to life or property



Why Do We Need Storm Spotters?

To Fulfill Our Mission!





Working Together to Protect Lives and Property

Spotters

- Spotters provide ground truth information of hazardous weather conditions
 - Provide critical information that only **people** can provide (storm damage, size of hail, tornado touchdown, visual storm clues, etc.)
 - To **fill in gaps** in the observation networks



How Do Spotters Help?





Working Together to Protect Lives and Property

How does NWS use these reports?

- **Warning Decision Process**
 - Confirm or revise existing NWS forecasts
 - Prompt the issuance of new warnings and advisories
 - Alerting the general public of weather hazards
- Passed along in timely statements to Emergency Management and Media
- Becomes part of US Climate database





Working Together to Protect Lives and Property

Spotter Essentials

- Staying Informed
- Understanding Seasonal Patterns, Thunderstorm Basics, and Visual Clues
- Identifying Key Weather Hazards
- Reporting Hazardous Weather





Staying Informed About the Weather



NATIONAL WEATHER SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

HOME FORECAST PAST WEATHER WEATHER SAFETY INFORMATION CENTER NEWS SEARCH ABOUT

Local forecast by "City, ST" or ZIP code
Enter location ...
[Location Help](#)

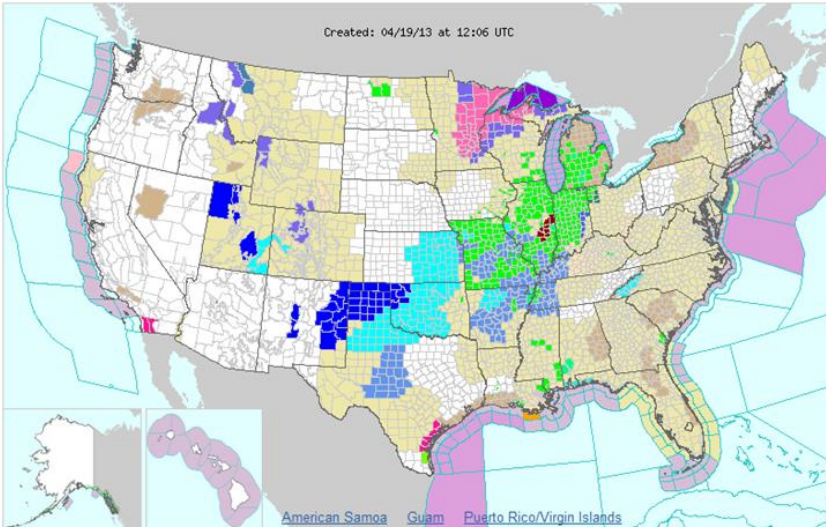
Storm system moves east, strong storms possible in Northeast, Mid-Atlantic and Southeast on Friday
The large storm system that brought snow to the Upper Midwest and severe weather from Michigan to Northern Louisiana on Thursday shifts east on Friday. The storm system will bring the threat of heavy rain, strong winds, and hail to the Eastern United States.
[Read More...](#)

Customize Your Weather.gov
City, ST
Enter Your City, ST or ZIP Code
☐ Remember Me

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ACTIVE ALERTS FORECAST MAPS RADAR RIVERS, LAKES, RAINFALL AIR QUALITY SATELLITE PAST WEATHER

Created: 04/19/13 at 12:06 UTC



Click on the map above for detailed alerts or [Public Alerts in XML/CAP v1.1 and ATOM Formats](#)

Flash Flood Warning	Freeze Warning	Small Craft Advisory	Winter Storm Watch
Special Marine Warning	Red Flag Warning	Lake Wind Advisory	Flood Watch
Winter Storm Warning	Winter Weather Advisory	Wind Advisory	Freeze Watch
Storm Warning	Flood Advisory	Frost Advisory	Special Weather Statement
Flood Warning	Coastal Flood Advisory	Low Water Advisory	Hazardous Weather
		Rip Current Statement	



Volunteer Spotters Stay Informed

Web, NOAA Weather Radio, TV, Radio, Social Media

WEATHER.gov





NWS Website – weather.gov



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ACTIVE ALERTS FORECAST MAPS RADAR

04/19/13 at 12:06 UTC

Click on the map above for detailed alerts or [Public Alerts in XML/CAP v1.1 and ATOM Formats](#)

Legend:

- Flash Flood Warning
- Special Marine Warning
- Winter Storm Warning
- Storm Warning
- Flood Warning
- Freeze Warning
- Red Flag Warning
- Winter Weather Advisory
- Flood Advisory
- Coastal Flood Advisory
- Small Craft Advisory
- Lake Wind Advisory
- Wind Advisory
- Frost Advisory
- Low Water Advisory
- Rip Current Statement
- Winter Storm Watch
- Flood Watch
- Freeze Watch
- Special Weather Statement
- Hazardous Weather

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Enter location
[Location Help](#)

News Headlines

- 2017 SKYWARN Spotter Training Schedule
- SAWS Aviation Workshop: Registration now OPEN!
- This Day in Weather History

NWS Forecast Office Phoenix, AZ
Weather.gov > NWS Phoenix

Current Hazards Current Conditions Radar Forecasts Rivers and Lakes Climate and Past Weather Local Programs

Click a location below for detailed forecast.

Map showing Phoenix area with various weather alerts (High Wind Warning, Freeze Warning, Red Flag Warning, Wind Advisory, Air Quality Alert, Hazardous Weather Outlook).

Last Map Update: Sat, Apr. 29, 2017 at 10:13:20 am MDT

Text Product Selector (Selected product opens in current window)

Latest Text Products Issued by PSR

Phoenix Radar Yuma Radar Satellite Forecast Discussion Weather Fast Page Local Climate Information

Local Graphical Forecast Forecast Weather Tables Hourly Forecasts Weather Map Submit Storm Report Skywarn

Social Media Heat Safety Monsoon Safety Fire Weather

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NWS Forecast Office Phoenix

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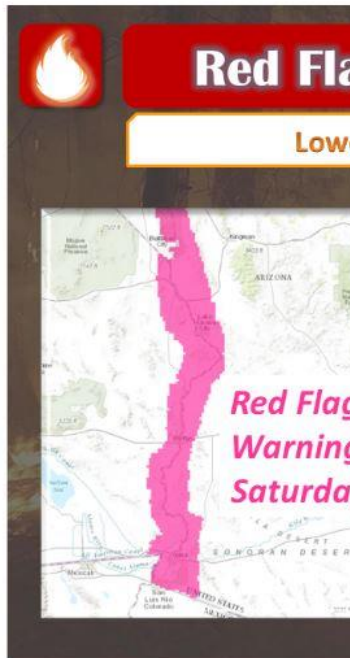
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Interact With Us NWSPhoenix

[Show Caption](#)

Click a location below for detailed forecast.



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[Watches, Warnings & Advisories](#)

- [High Wind Warning](#)
- [Freeze Warning](#)
- [Red Flag Warning](#)
- [Wind Advisory](#)
- [Air Quality Alert](#)
- [Hazardous Weather Outlook](#)



Text Product Selector (Selected product opens in current window)

Latest Text Products Issued by PSR



[Phoenix Radar](#)



[Yuma Radar](#)



[Satellite](#)



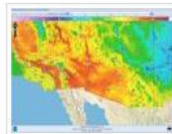
[Forecast Discussion](#)



[Weather Fast Page](#)



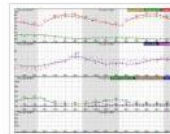
[Local Climate Information](#)



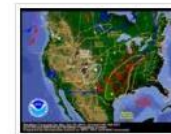
[Local Graphical Forecast](#)



[Forecast Weather Tables](#)



[Hourly Forecasts](#)



[Weather Map](#)



[Submit Storm Report](#)



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[Heat Safety](#)



[Monsoon Safety](#)



[Fire Weather](#)



Skywarn Page on weather.gov/phoenix



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NWS Forecast Office Phoenix, AZ

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NWS Phoenix
Weather Forecast Office

[Current Hazards](#) [Current Conditions](#) [Radar](#) [Forecasts](#) [Rivers and Lakes](#) [Climate and Past Weather](#)

[Local Programs](#)

Red Flag Saturday



Red Flag Warning Today

Lower Colorado River Valley

Local Programs

[Fast Page](#)

[Preparedness /
StormReady](#)

[Skywarn](#)

[Heat Safety](#)

[Monsoon Safety](#)

[Items of Interest](#)

[Other Useful Links](#)

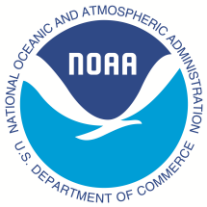
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Resources](#)

[COOP Observer](#)

[Our Office](#)



DATE	TIME	CITY	LOCATION	ADDRESS	REGISTRATION	NOTES	INSTRUCTOR
3/26/2019	6:30pm	Paradise Valley	Town Hall - Community Room	6401 E. Lincoln Dr.	Click here for registration	Standard/Basic Class Map	Austin
3/28/2019	7pm	Avondale	Avondale Fire Administration	1825 N. 107th Ave.	Click here for registration	Standard/Basic Class Map	Austin
3/30/2019	12pm	Tempe	Tempe Public Library	3500 S. Rural Rd.	Click here for registration	Standard/Basic Class Map	Austin
4/9/2019	11am	Phoenix	Anderson Security offices	2555 W Morningside Dr. Phoenix 85023	Click here for registration	Standard/Basic Class Map	Marvin
4/11/2019	7pm	Glendale	Glendale Regional Public Safety Training Center	11550 W. Glendale Ave. Glendale, AZ 85307	Click here for registration	Standard/Basic Class Map	Austin
4/16/2019	7pm	Gilbert	Gilbert Fire Dept. Administration	85 E. Civic Center Dr.	Click here for registration	Standard/Basic Class Map	Marvin
4/23/2019	6:30pm	Mesa-Falcon Field	Civil Air Patrol office	4730 E Falcon Dr.	Click here for registration	Standard/Basic Class Map	Jaret
4/23/2019	6:30pm	Phoenix	Burton Barr Library - Lecture Room	1221 N. Central Ave.	Click here for registration	Standard/Basic Class Map	Austin
4/27/2019	1pm	Scottsdale	Mustang Library Auditorium	1010	<p>When calling, spotters should tell the NWS briefly WHAT they saw or are seeing, WHERE they are or where they were when it was going on, WHEN it was occurring and WHAT is/was it doing. They should also include their name, location and their assigned spotter ID number.</p> <p>The following criteria are what spotters should look for when phoning in their reports. They should always call the responsible Weather Service Office when any of the below are noted:</p>		
4/29/2019	6pm	Blythe	City Hall Council Chambers-Multipurpose Room	235			
5/1/2019	6:30pm	Mesa	Mesa Fire Department - Coyote Conference Room	708 N			
5/4/2019	10am	Globe	Gila County Emergency Services	5515 Suite	1.	TORNADO (on the ground) or FUNNEL CLOUD (tail not touching the ground)	
5/7/2019	6pm	Salome	McMullen Valley Fire Station 1	66	2.	ROTATING WALL CLOUD	
5/13/2019	6:30pm	Yuma	Yuma County Public Health auditorium	2200	3.	MICROBURST (visually identified)	
5/16/2019	7pm	Apache Junction	Superstition Fire and Medical District - Lost Dutchman Room	565	4.	RAINFALL (1/2 inch (.50) or more in 30 minutes)	
5/18/2019	10am	Queen Creek	Queen Creek Library - Zane Gray Room	218	5.	FLOODING (of any kind)	
5/22/2019	7pm	Peoria	Public Safety Administration Building	835	6.	DAMAGE and/or DEATHS and/or INJURIES due to the weather event	
					7.	HAIL (Any size diameter)	
					8.	VISIBILITY (less than 1 mile due to fog, dust, blowing snow or ash)	
					9.	SNOWFALL (any amount).	



Staying Informed

Social Media



- Facebook 
 - www.facebook.com/NWSPhoenix
 - Typically post an item of interest a few times per day including outlooks, storm summaries, climate info, etc.
- Twitter 
 - [@NWSPhoenix](https://twitter.com/NWSPhoenix)
 - More frequent posts, especially during ongoing weather events.
- YouTube 
 - www.youtube.com/NWSPhoenix
 - Variety of topics including seasonal outlooks.



- All are accessible from icons on weather.gov/phoenix





US National
Weather Service
Phoenix Arizona ✓
@NWSPhoenix

facebook

Likes

Videos

Jobs

Promote



Like

Following

Message

More



US National Weather Service Phoenix Arizona

Published by Jeral Estupinan [?] · 17 mins ·

After the wet weekend, warm and dry conditions will last most of the week. Some breezy conditions can be expected on Wednesday and Thursday as a weak cold front moves through the area. Another storm system is expected Sunday and Monday, with rain chances returning.



220 people reached

Boost Post

Like

Comment

Share

6



Write a comment...



US National Weather Service Phoenix Arizona

Published by Jeral Estupinan [?] · 9 hrs ·

After our most recent rain event, year-to-date precipitation is now above normal at both Phoenix and Yuma.



Year-to-Date Precipitation Above Normal



Phoenix



Yuma





Twitter



Tweets 23.7K Following 254 Followers 30.4K Likes 5,391 Lists 21 Moments 0

NWS Phoenix

@NWSPhoenix

Official Twitter account for the National Weather Service Phoenix, Arizona. Details: weather.gov/twitter

Phoenix, AZ

weather.gov/phoenix

Joined May 2012

10.3K Photos and videos



Tweets Tweets & replies Media



NWS Phoenix @NWSPhoenix · 55m

The high at PHX Sky Harbor has been 83 degrees - only 4 degrees warmer than Seattle - and we're 5 degrees above our normal! #azwx

NWS Seattle @NWSeattle

High Temperatures (so far) across the area today:

Seattle: 79°

Quillayute: 79°...

1 9 10



NWS Phoenix @NWSPhoenix · 3h

Watching some light showers for SE #cawx early this afternoon. Not much accumulation, but may be some wet roads if driving I-8 or I-10. Watch out for gusty winds as well.





Staying Informed

NOAA All Hazards Weather Radio

- Routine Products
 - 7 Day Local Forecast
 - Hourly Observations
 - Local and Regional
 - Traveler's Forecast
 - Daily Climate Summary
 - Forecast Overview





NOAA All Hazards Weather Radio



Non-routine Products

- Watches , Warnings, and Advisories
 - *Severe Thunderstorm, Flash Flood, Dust Storm, Tornado, etc.*
 - *Tone Alert feature sounds an alarm tone for warnings without needing to have the volume on.*
- Amber Alerts
- Civil Emergency Messages

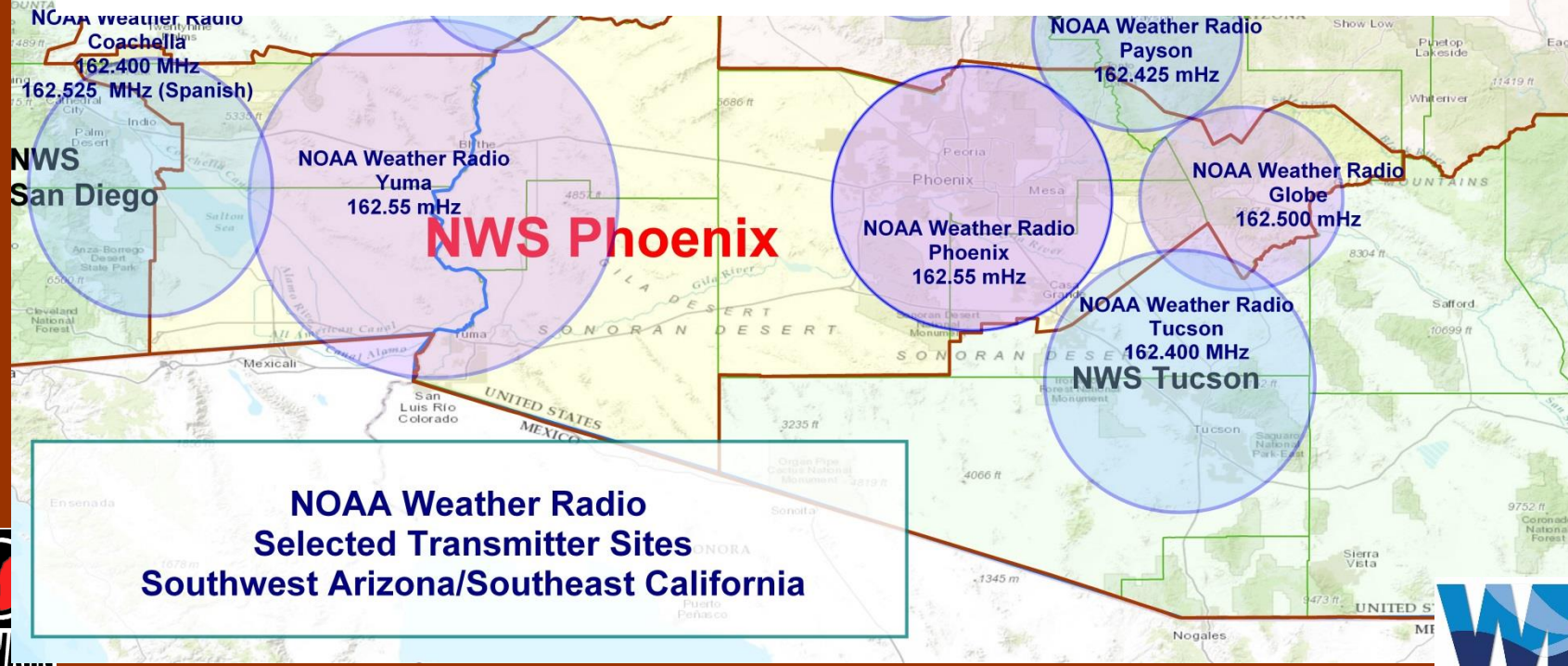


Weather Radio Coverage Areas

National Weather Service Offices in Arizona

Digital NWR (Phoenix, Yuma, Globe radios)

<https://www.wrh.noaa.gov/psr/podcast.mp3/podcast.php>



Cell Phone Alerts

“Wireless Emergency Alerts [WEA]”

- Partnership between providers, FEMA, NWS.
- Weather related Messages:
 - **Tornado, Flash Flood, Dust Storm, Snow Squall** (also includes Hurricane and Tsunami for coastal areas).
- Non Weather:
 - Amber alerts, Evacuation, Presidential Emergency message
- Uses the cell phone location (nearest tower) to determine if phone needs to send alert.
- ***NOT*** a text message; no cost to receive.
- Users can opt out; may need to opt in for new phones/accounts.
- **Tremendous step forward getting timely weather warnings out to more of the public.**



Seasonal Weather Hazards

Cool Season vs. Warm Season





Cool Season Hazardous Weather Concerns

- Widespread rain events leading to flash flooding
- Hail – most likely to occur on the deserts during the cool season
- Though rare, tornadoes can occur on the deserts (January-March, Sep-Oct)
- Prolonged strong winds – especially April





Summer/Monsoon Hazardous Weather Concerns

- Heat (#1 weather related killer)
- Downbursts/microbursts
- Dust Storms
- Flash Flooding
- Lightning
- On very rare occasion - tornadoes





Summer Weather Patterns

Monsoon

- Key Factors

- Heating

- Complex Terrain

- Moisture Fluxes

- Occasionally upper Lows





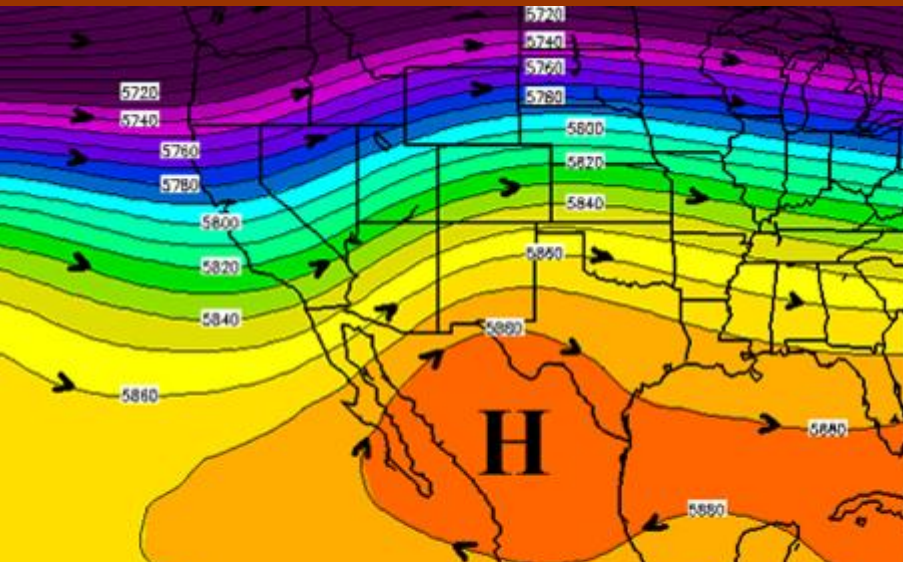
Monsoon



- Definition
 - a seasonal reversal in the prevailing wind flow patterns.
- This tends to occur June 15 – September 30. Thus our local calendar based definition.
- A Monsoon is NOT
 - a thunderstorm that occurs in Summer.
- The Arizona Monsoon is part of the North American Monsoon.

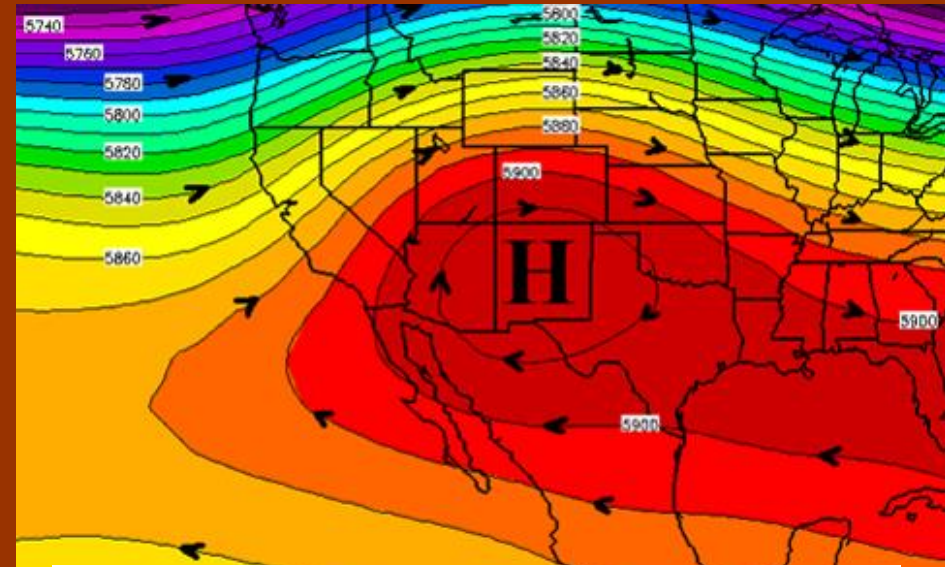


Monsoon - Wind Pattern Change



June avg. flow pattern (18,000 feet ASL)

Southwesterly Flow - Dry



July avg. flow pattern (18,000 feet ASL)

- Easterly flow over Mexico
- South-southeasterly flow over Arizona
- Winds bring moisture leading to thunderstorms

Monsoon – Lower Levels





Focus on Thunderstorms

Why?

- Damaging Wind (downbursts/microbursts)
- Heavy Rain: Flooding
- Lightning
- Hail
- Tornadoes
- Thunderstorms can occur any month of the year

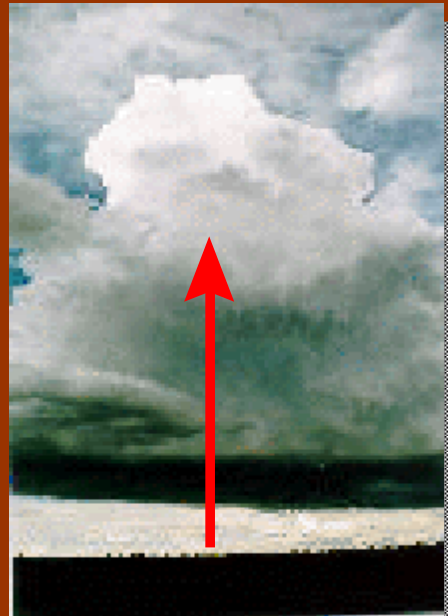
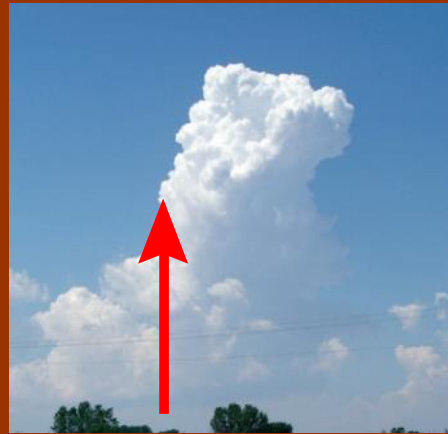
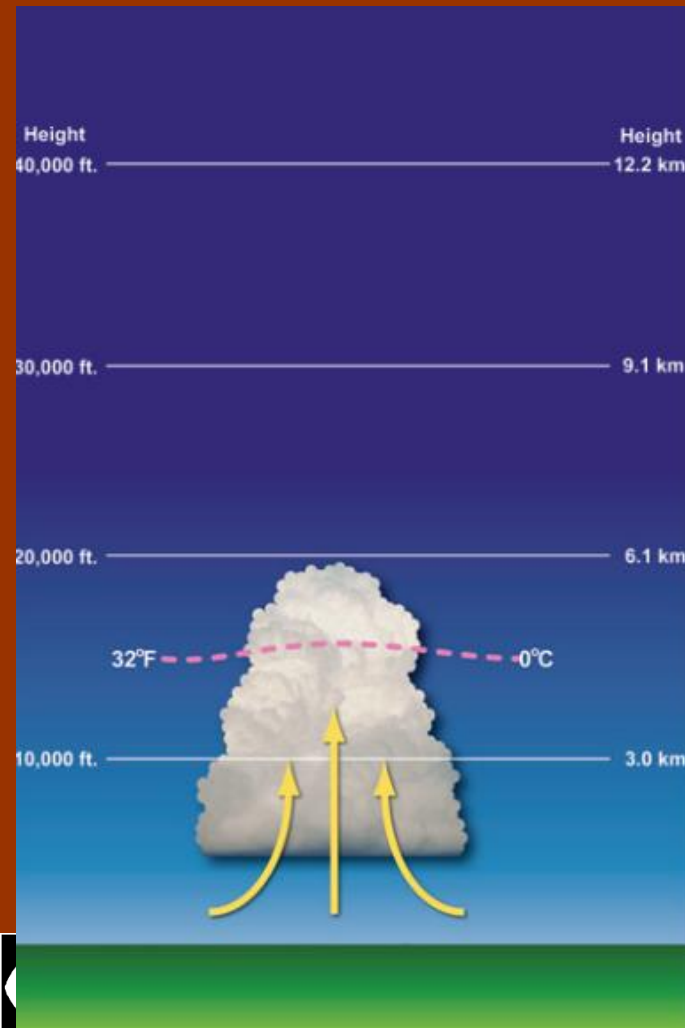


Thunderstorm Ingredients

- **Moisture**
 - Preferably in the lower to mid levels of the atmosphere.
- **Instability**
 - Ability of air to accelerate upward = buoyancy.
- **Lift**
 - Method of forcing air upward such as flow over mountains; fronts; thunderstorm gust fronts; etc.

Thunderstorm Life Cycle

Developing Stage - Cumulus



Developing
updrafts – upward
moving air currents

Visible as cumulus
clouds with
upward vertical
extent

Nearly all motion is
upward

Thunderstorm Life Cycle

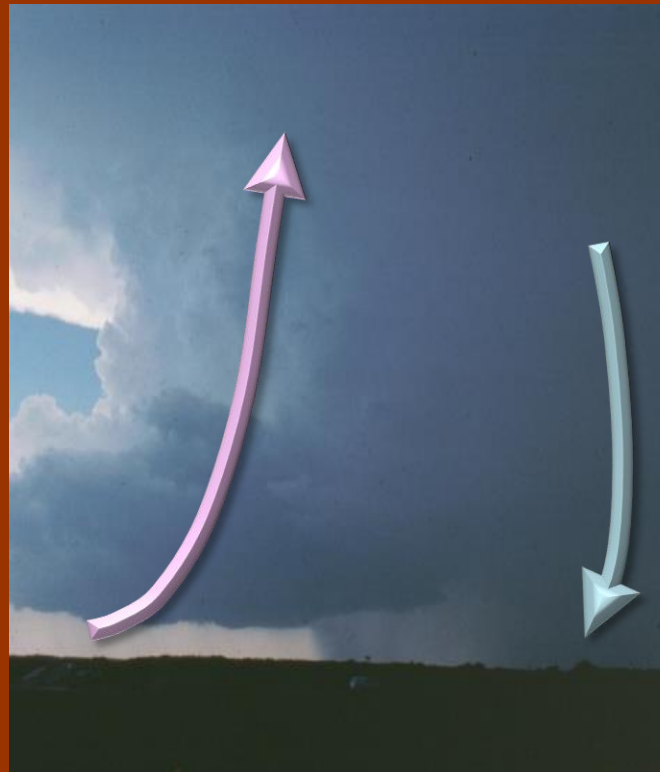
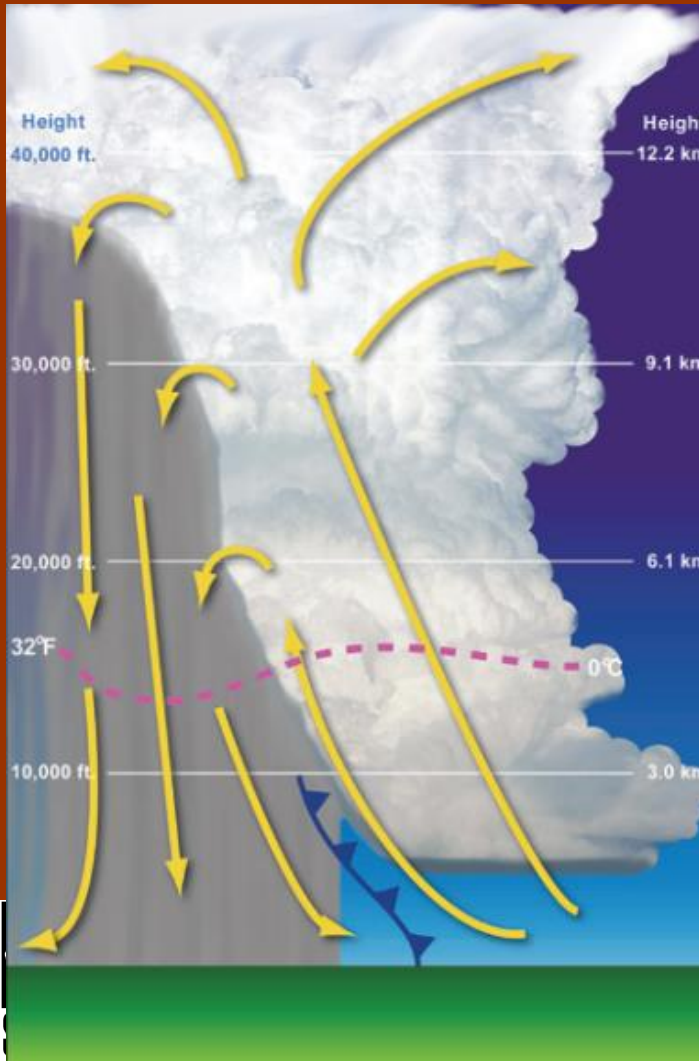
Mature Stage

Most dangerous stage
in the storm's life

Updrafts,
downdrafts,
precip all
occurring

Vertical cloud
tower, rain-free
base mark
updraft

Dark precip area
marks downdraft



Thunderstorm Life Cycle

Dissipating Stage

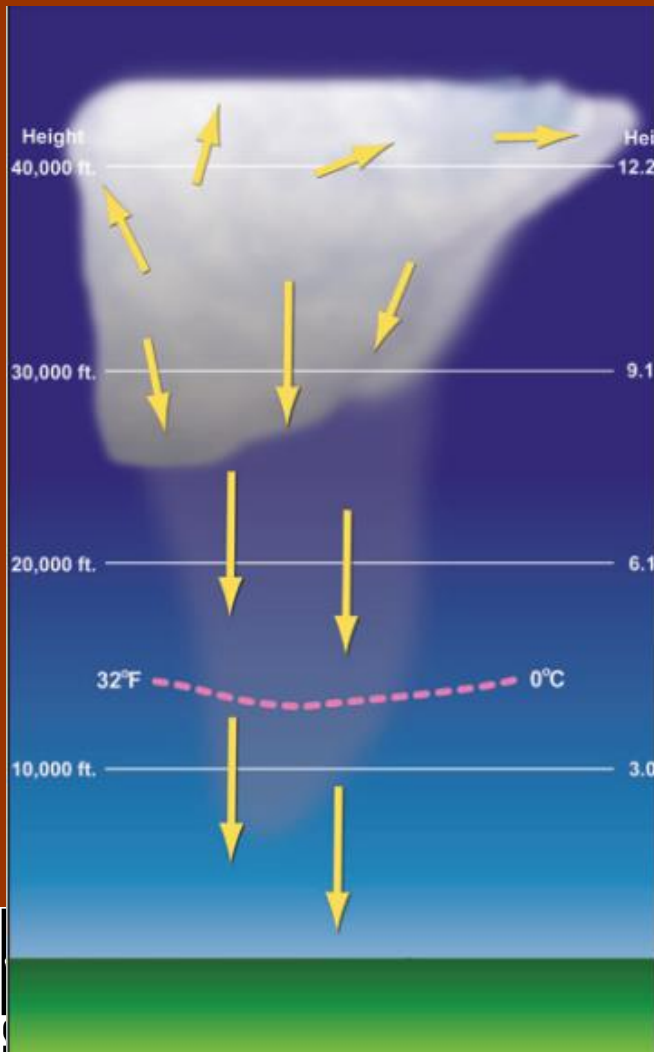


Photo: Roger Edwards



Photo: Gary Woodall

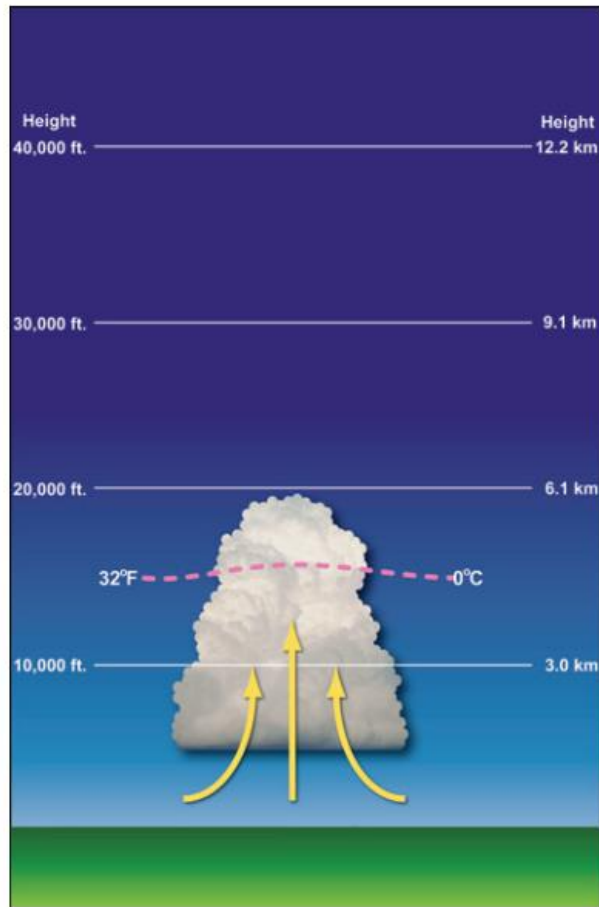


Updrafts weaken,
downdrafts/
precip become
dominant

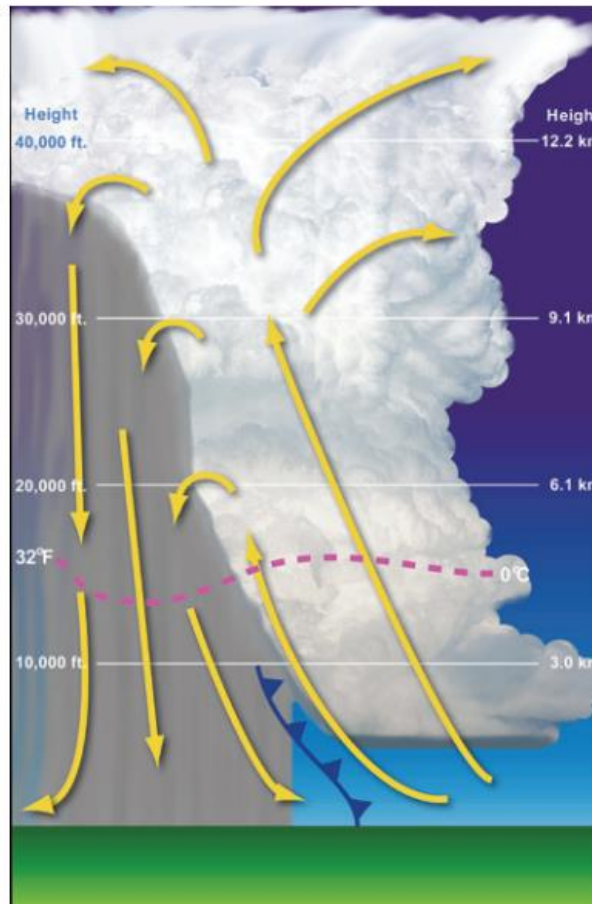
Clouds take on a
ragged, fuzzy
appearance

Outflow may
provide lift for
new storms in the
area

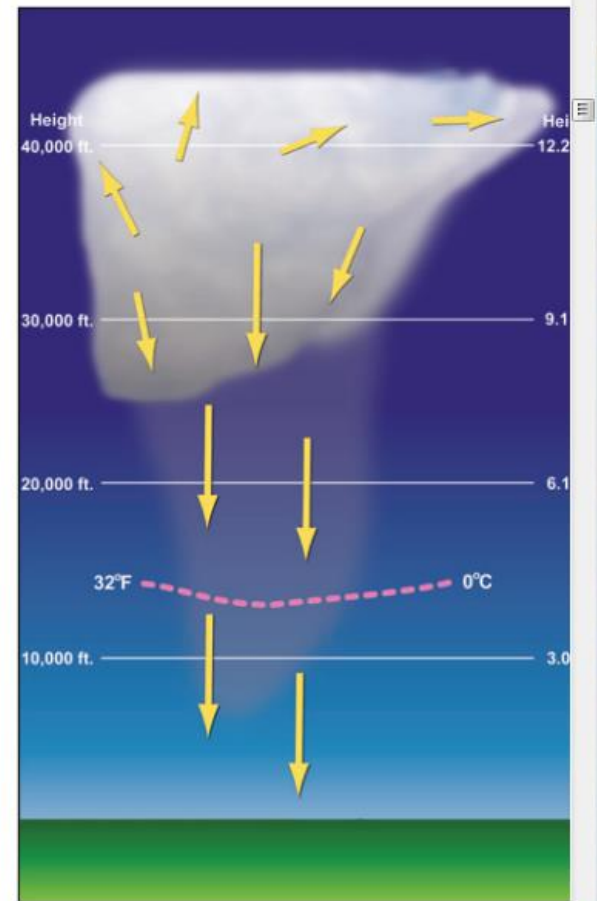
Thunderstorm Life Cycle



Towering Cumulus Stage



Mature Stage



Dissipating Stage

Visual Characteristics

Strong Thunderstorms, Downbursts, and Tornadoes



Strong Storm Components

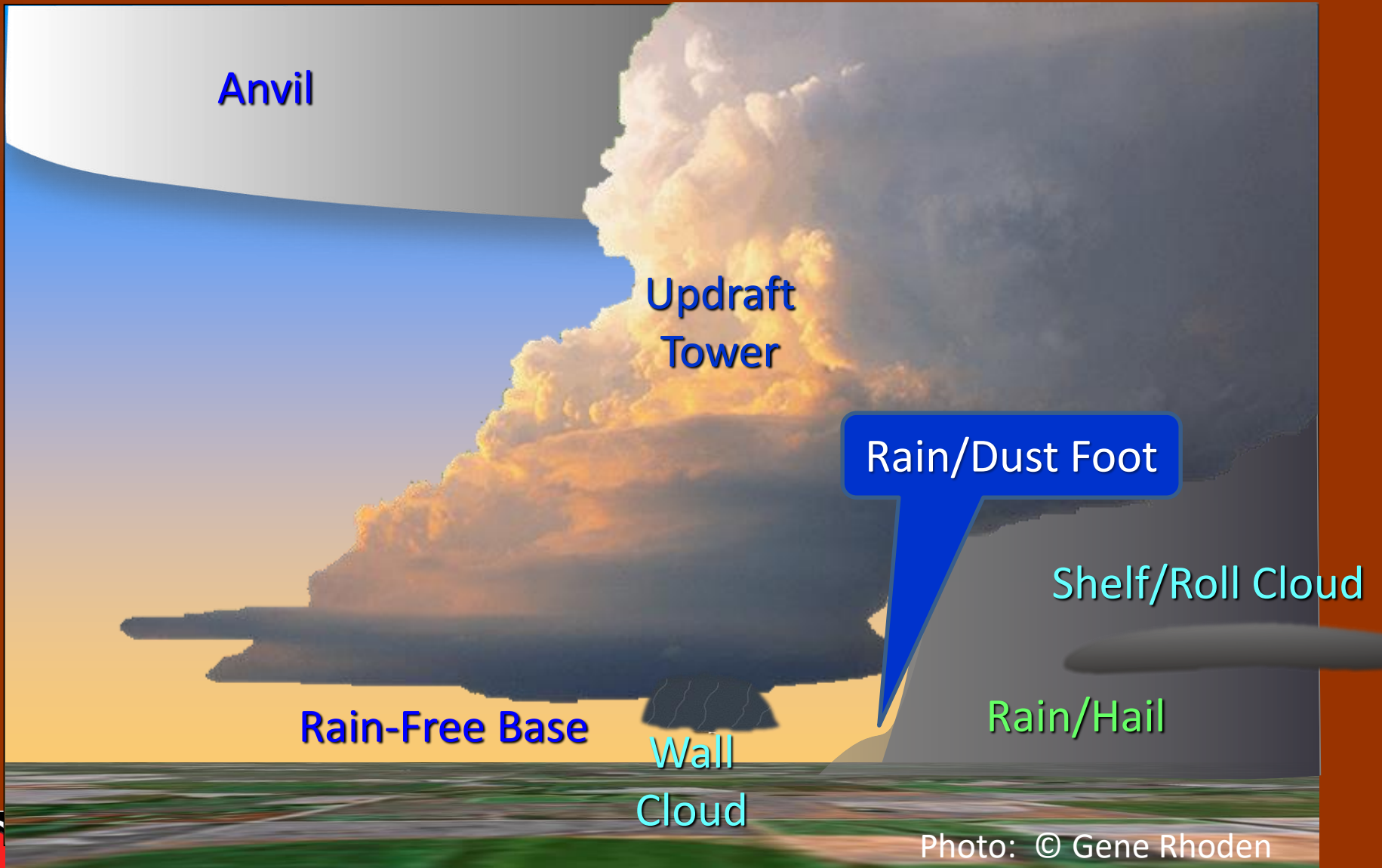


Photo: © Gene Rhoden

Strong Updraft Visual Clues

- Billowy
- Cauliflower Look
- Crisp, Distinct Edge
- Thick, sharp-edged anvil



Strong Updraft Visual Clues



Photo: Gary Woodall

Rain-free base

Flat cloud base

Little *visible*
precipitation

May see updraft
tower above

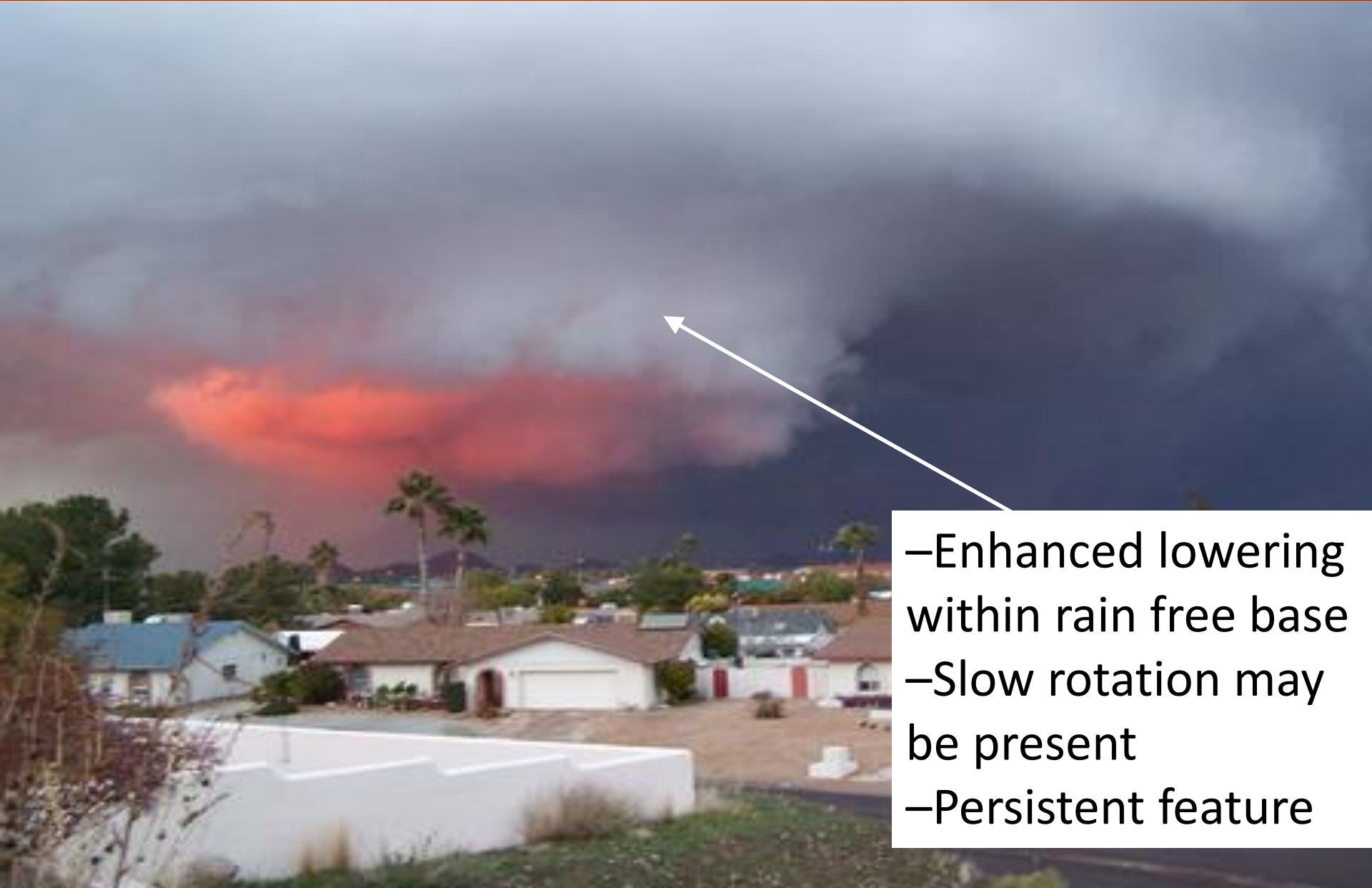
Strong Updraft Visual Clues

Overshooting
Top

Anvil

- Large “domelike” top
- 5-15 Minutes
- Collapse

Wall Cloud



- Enhanced lowering within rain free base
- Slow rotation may be present
- Persistent feature



Wall Clouds





Wall Clouds





Strong Updrafts



Strong Downdraft Clues

Outflow spreads out and “curls” away from impact point. Curls may accelerate surface winds.

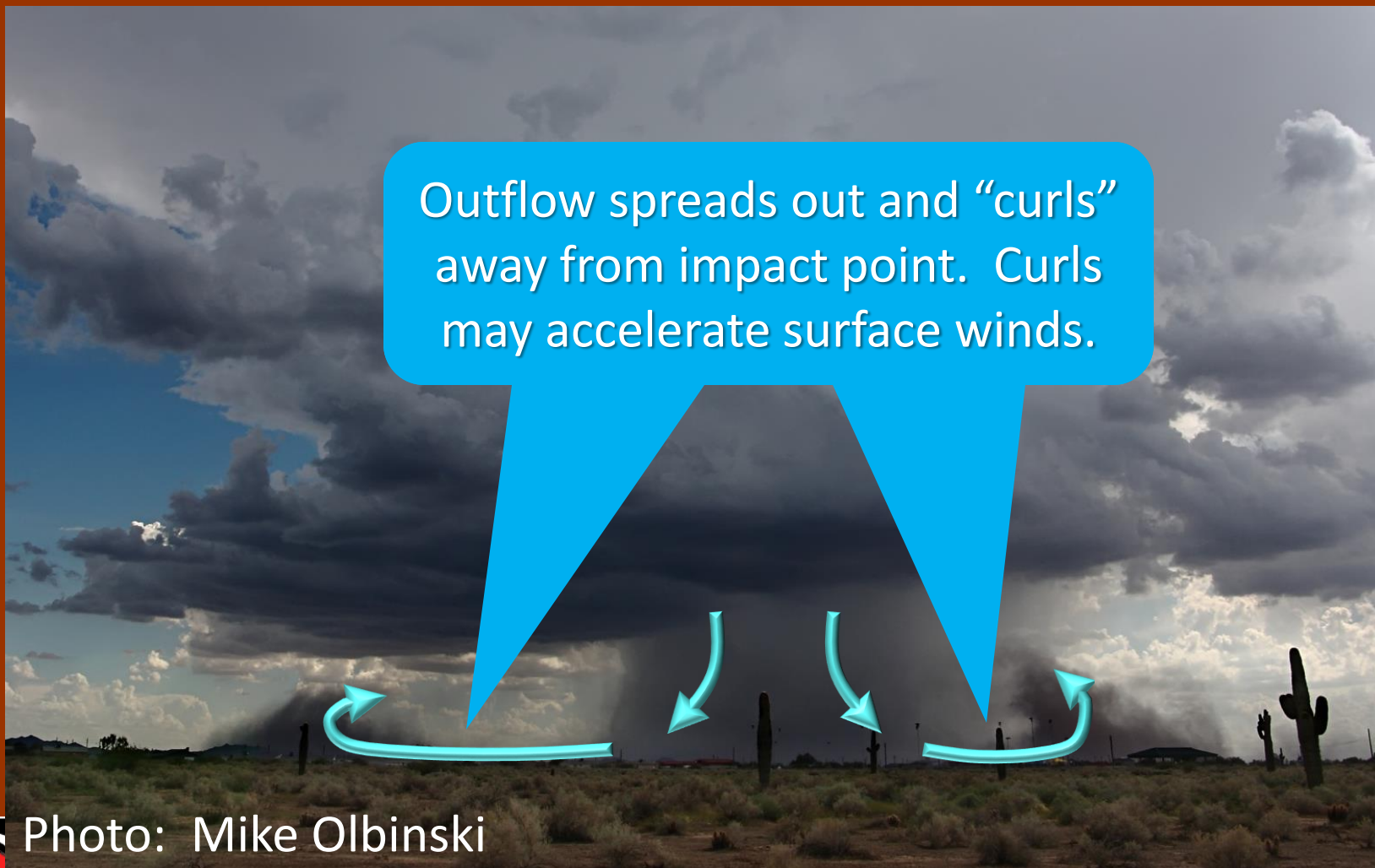


Photo: Mike Olbinski

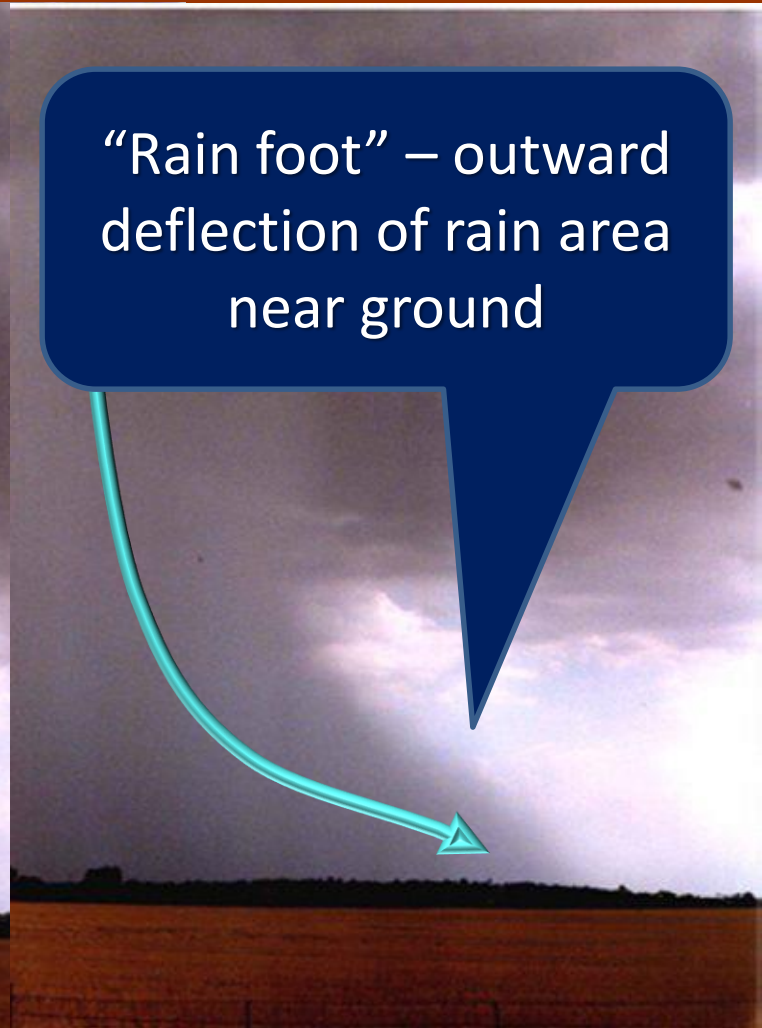
Strong Downdraft Clues



Beginning



One minute Later



2 Minutes Later

Downbursts

Terminology

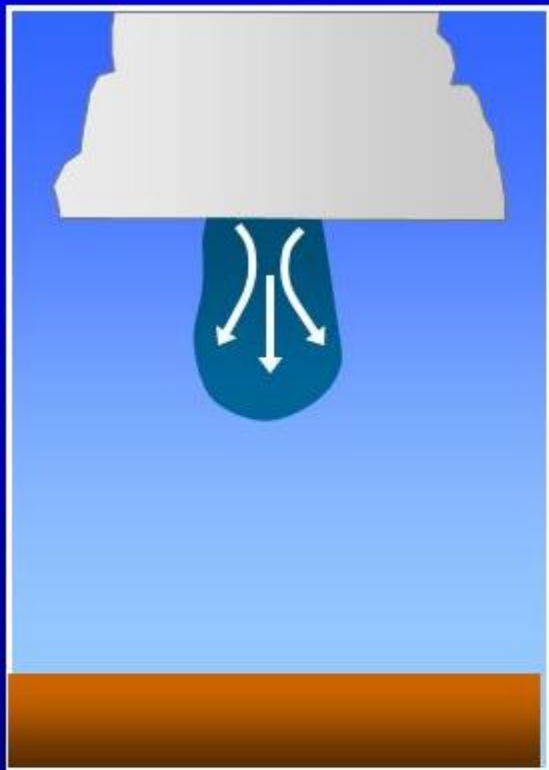
- **Downburst**
 - a concentrated severe downdraft that induces an outward burst of damaging winds at the surface
- A microburst *is* a downburst
 - Limited areal extent up to 4 km (~2.5 mi) across
- A macroburst is greater than 4km in areal extent

Downbursts

- Key mechanism: Evaporative Cooling
 - evaporation of rain falling below cloud base
 - intrusion of dry air aloft
- Wind speeds may exceed 100 mph
- Most common mechanism for thunderstorm wind damage on the deserts
- Mistaken for tornado damage
 - Downburst: straight line winds
 - Tornado: narrow twisted path

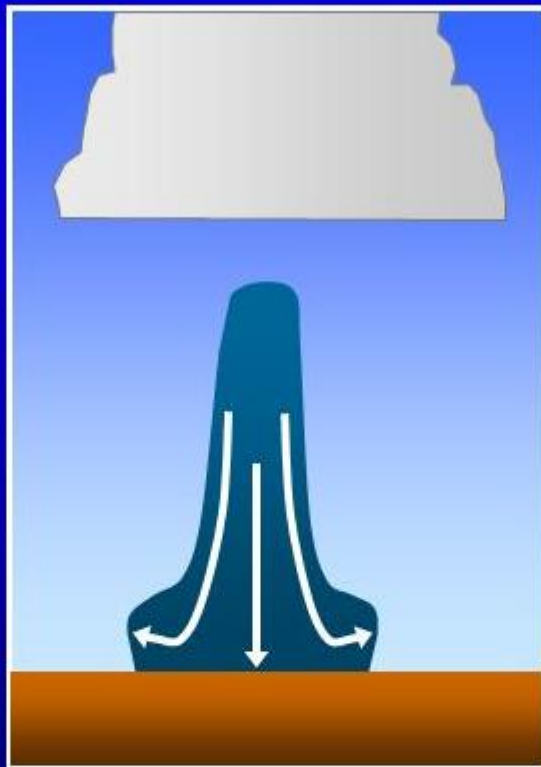


Downburst Lifecycle



FORMATION

Evaporation and precipitation drag forms downdraft



IMPACT

Downdraft quickly accelerates and strikes the ground



DISSIPATION

Downdraft moves away from point of impact

Downburst Life Cycle



Descending stage

Impact stage (most dangerous)

Dissipating stage

Heavy “glob” of rain may indicate a downburst. Some downbursts have little rain reaching the ground.

Entire process can occur in just a few minutes. Difficult to detect on radar.

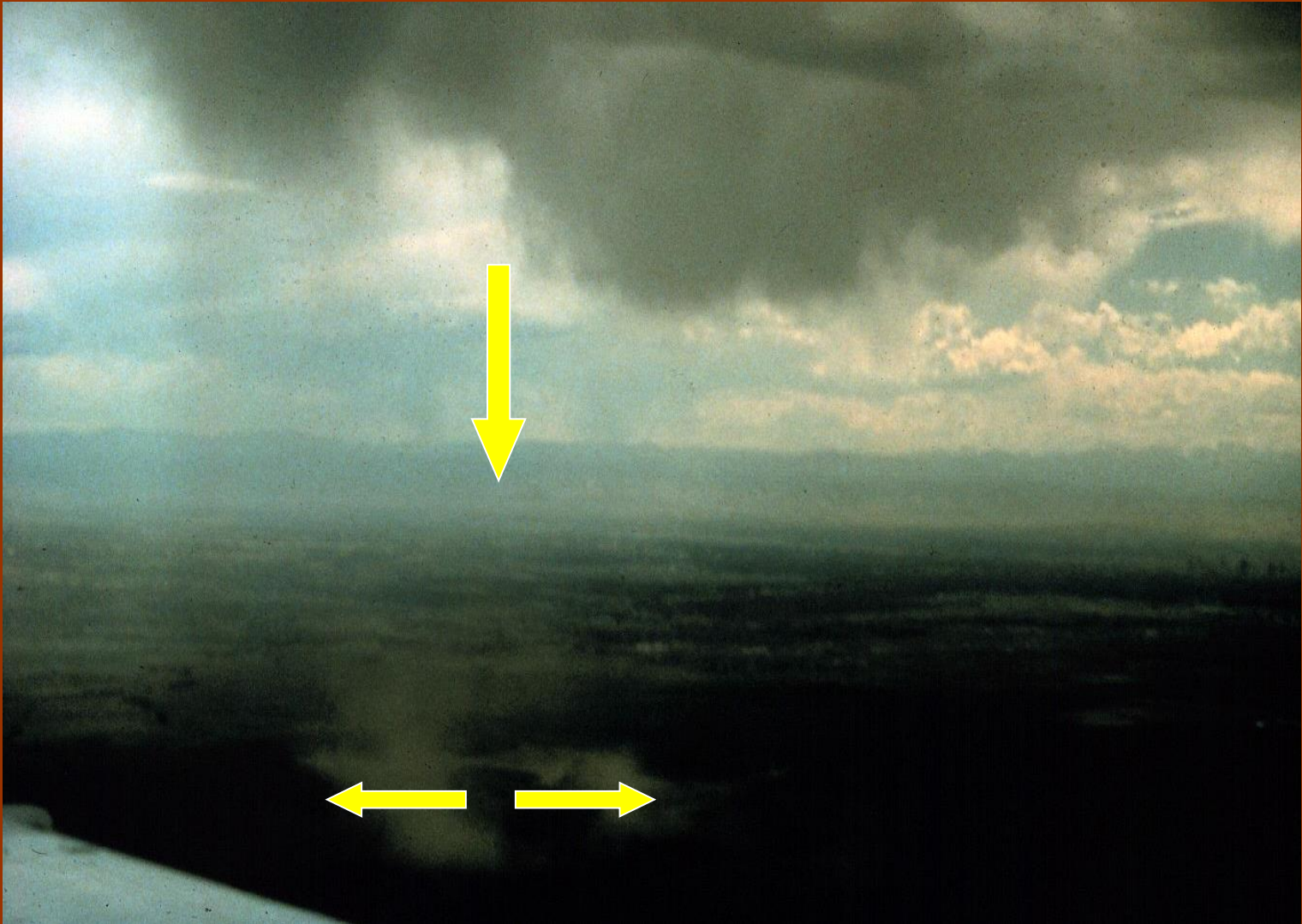
ASU – CuPido Project

Dry Microburst

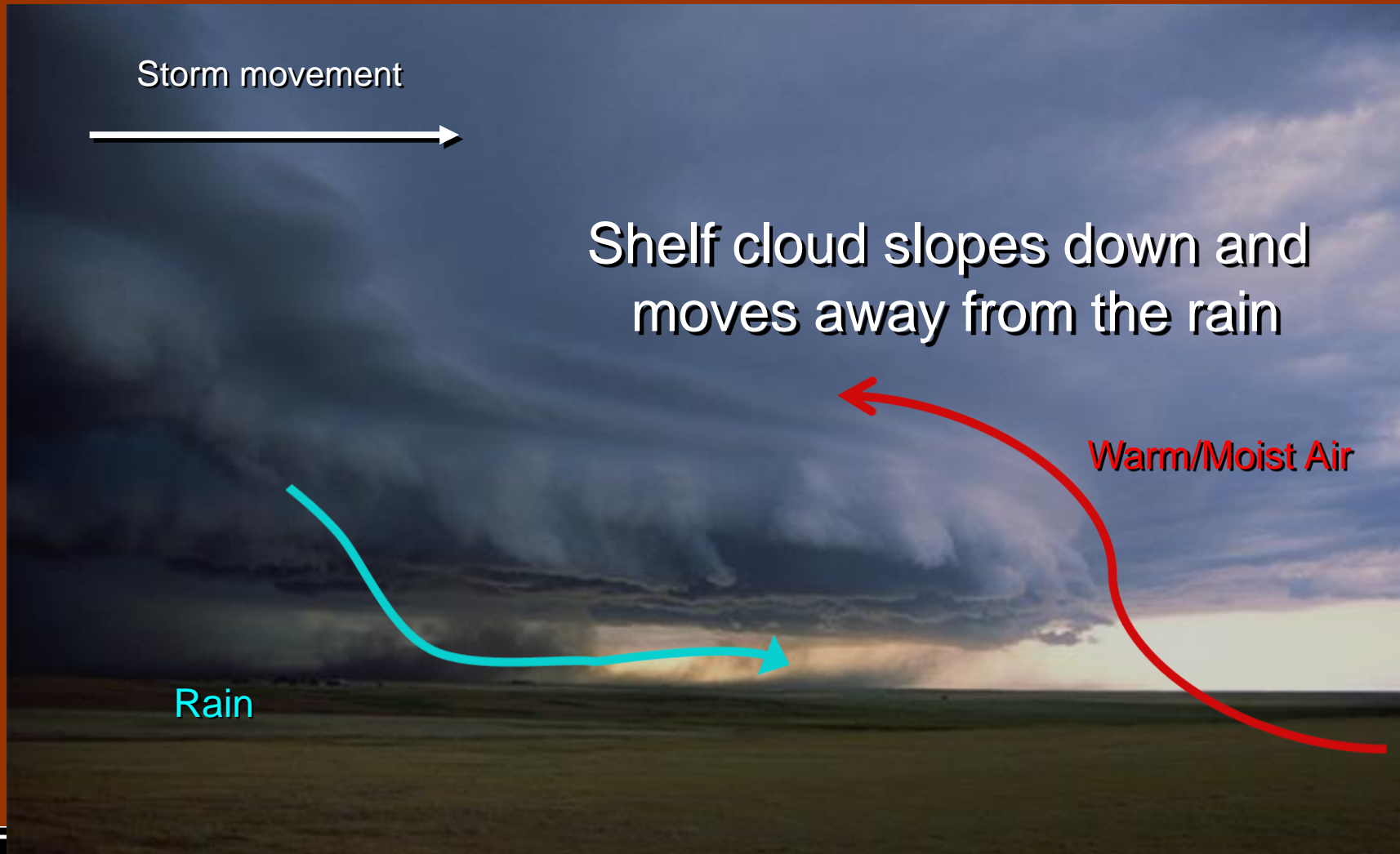
- Occurs when most or all of the rain evaporates from the downdraft
- Can cause damaging wind without any rain falling



Dry Microburst



Shelf Cloud



Shelf Clouds



Photo: Mike Pflueger

Shelf Clouds

Photo Credit: Bryan Snider



Shelf Clouds



Paul Knightly

Shelf Clouds



Strong Downdraft Clues





Shelf Cloud



Bryan Snider





Strong Storm Characteristics



- Strong updraft
 - Thick anvil
 - “Hard” cauliflower updraft tower
 - Rain-free base
 - Wall cloud
- POSSIBLE storm rotation
 - Rotating wall cloud (rare!)
- Strong downdraft and outflow
 - Small, heavy, rapidly-forming rain area
 - Rain/dust foot
 - Shelf cloud (occasionally)



Tornadoes



- Violently rotating column of air in contact with the ground
- Winds from 65 mph to greater than 200 mph!
- Movement in general direction of parent thunderstorm but may track erratically in circles
- Always connected to a storm cloud (even dvlpg. stage)

Report Tornado

Tornadoes

- Averages
 - Arizona: 5 per year
(10/6/10 had at least 10)
 - California: 11 per year
- Tend to be weak – (Winds 65 to 110 mph)
- Tend to be short lived – lifetime of a few minutes, path on ground less than 1 mile
- Enhanced Fujita (EF) Scale – rates tornadoes based on damage. EF-0 to EF-5



Funnel Clouds

- Funnel shaped cloud extending from the base of a cumuliform (thunderstorm) cloud
- Rotation
- Circulation NOT on the ground
- More than one possible
- Lasts for seconds to several minutes

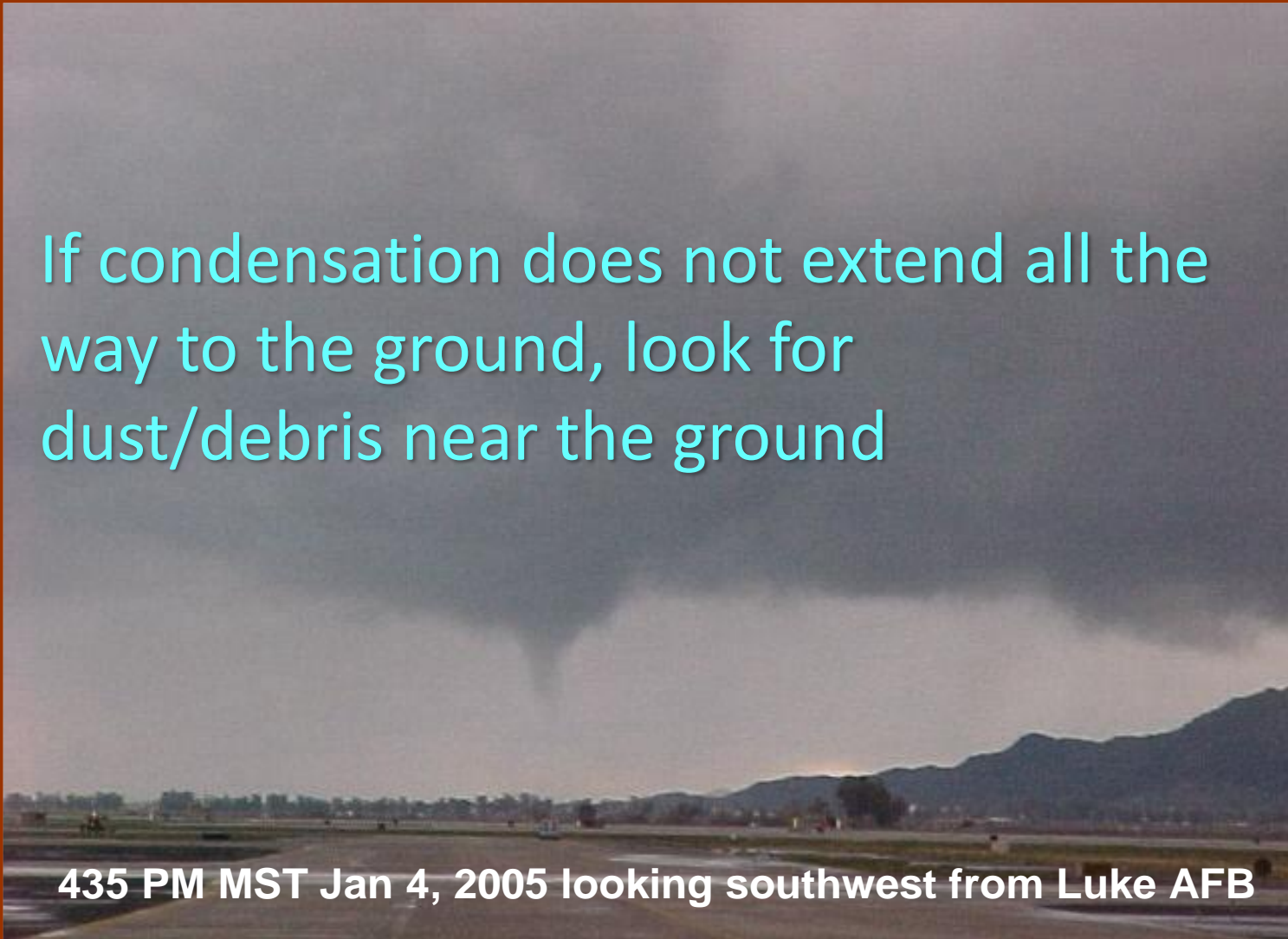


Report Funnel Cloud



Tornado or Funnel Cloud?

If condensation does not extend all the way to the ground, look for dust/debris near the ground



435 PM MST Jan 4, 2005 looking southwest from Luke AFB



Funnel Cloud or Tornado?





Tornado or Funnel Cloud?



Trey Greenwood





What would you report?

Tornado or Funnel Cloud?

- Neither!
 - No Rotation



Tornado and Funnel Cloud

"Imposters"

- Scud Clouds
 - Ragged Low-Level Clouds
- Rain Shafts, Virga
- Smoke Columns
- Steam Plumes
- Gustnadoes
- Look For Rotation
 - no rotation: imposter
- Watch for Persistence of the feature
 - what initially looks like a funnel, may turn out to be scud



Ken Waters

Tornado Imposters

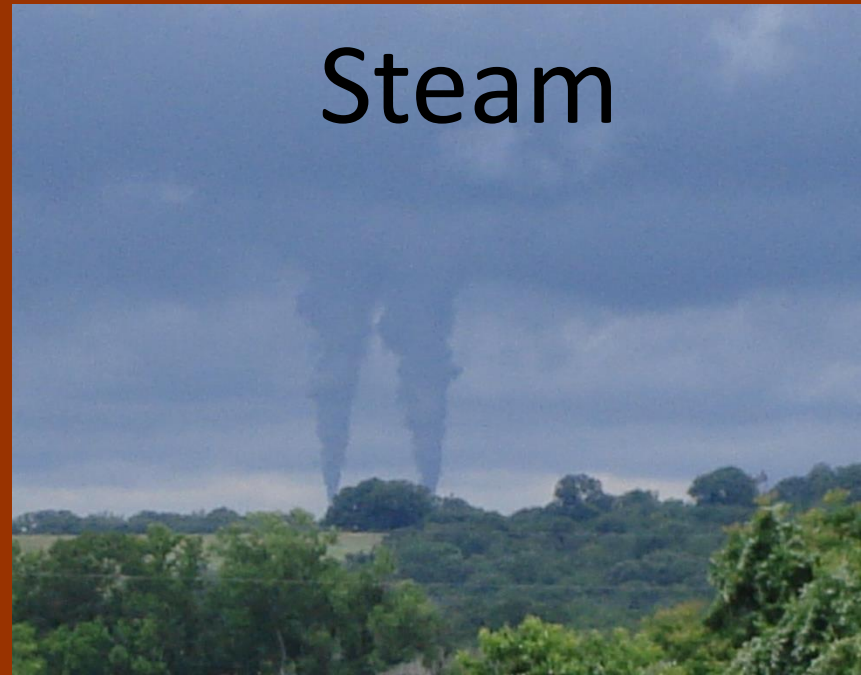
Scud



Steam



Steam

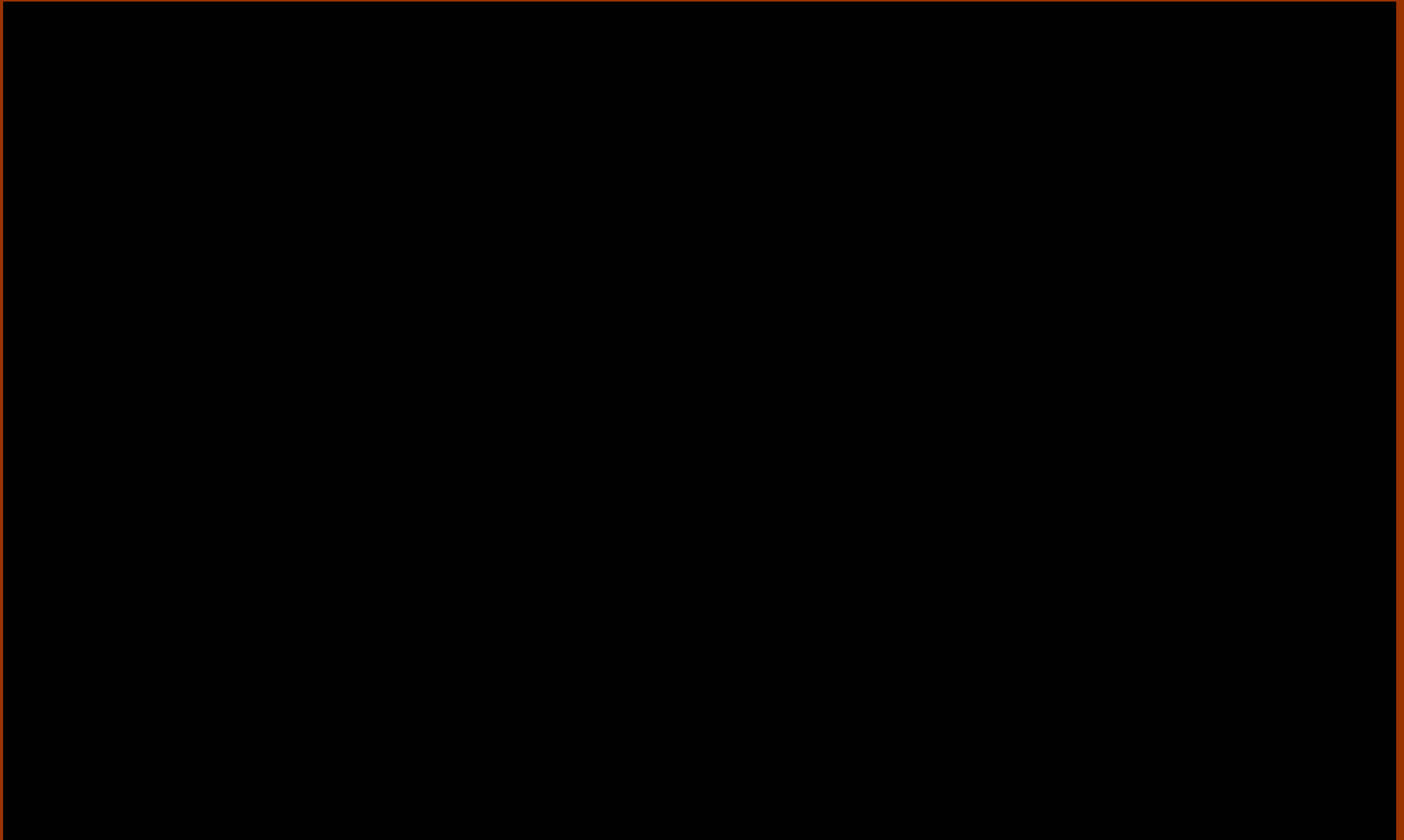


Scud





"Gustnadoes"



Video: Bill Reid, Tim Marshall



Weather Hazards to Report

- Tornadoes & Funnel Clouds
 - must have rotation!
 - persistence
 - beware of imposters!



Weather Hazards to Report

- Rotating Wall Cloud
 - Pronounced lowering attached to rain free base
 - If it is has rotation, report it!
 - Don't confuse with scud!



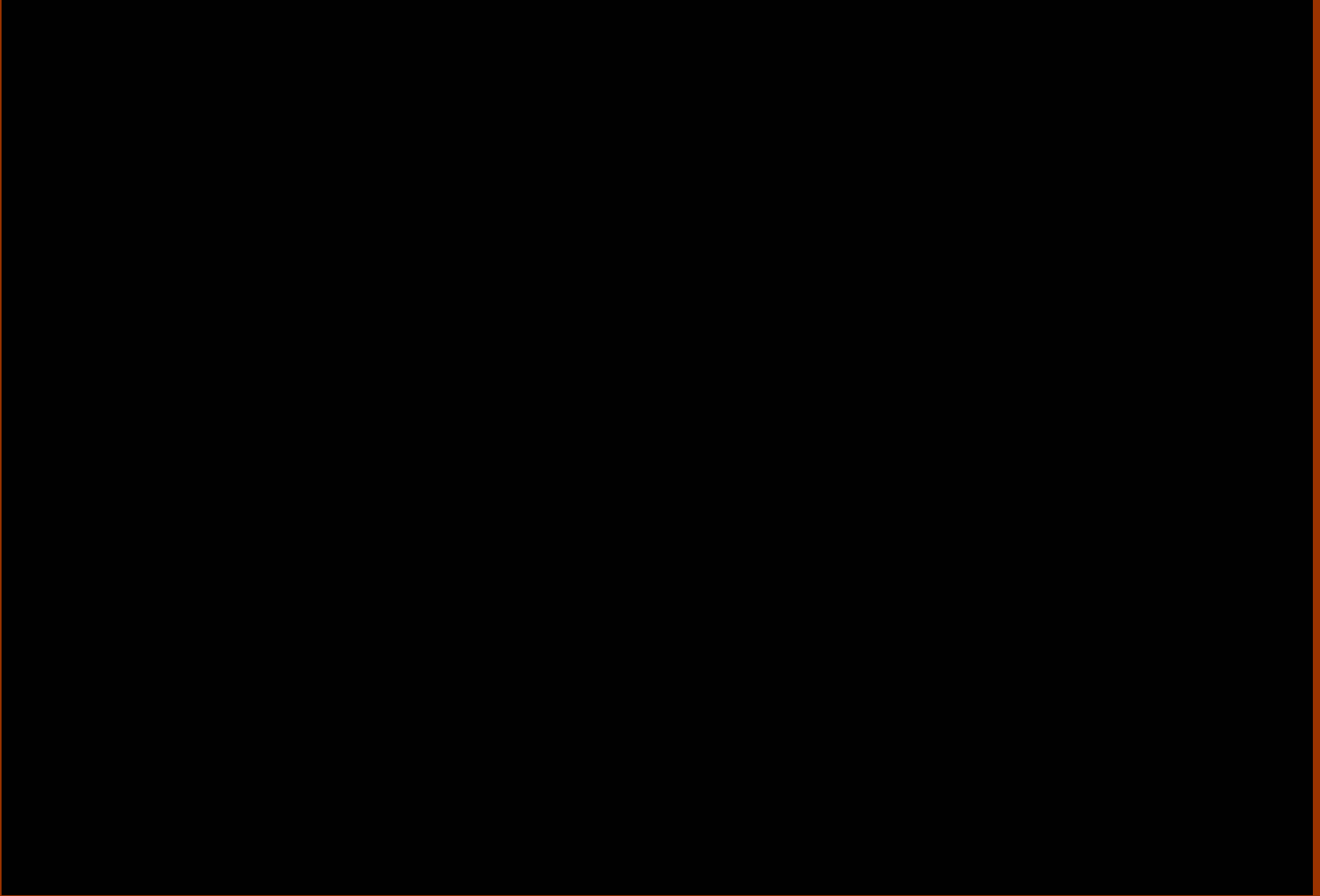
Margaret Faulkner



Jeremy Perez



Rotating Wall Clouds and Tornadoes



Video: Bobby Eddins, Roger Hill, KXXV-TV, KPNX-TV, Steve Miller,
Matt Starkey, Gary Woodall



Weather Hazards to Report

- Flash Flooding
 - Direct threat to life and/or property; Warning situation
 - Short term inundation
 - 1 to 6 hours from onset of rain
 - small washes and unbridged crossings especially vulnerable
 - **Always report running washes!**



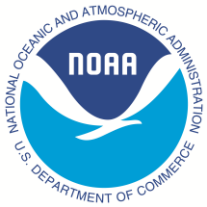
**About 6 hours after
heavy rain fell 40+ miles
north of my location.**

Weather Hazards to Report

- Urban and Small Stream Flooding
 - Traffic flow impeded
 - Not a direct threat to life but could pose a hazard if caution is not exercised
 - Advisory situation
 - **Always report running washes!**



Liz Skeens



Weather Hazards to Report

Reportable Flooding

- Flowing water covering roadway
- Running washes
- Submerged roadway (underpasses, curb lanes, intersections)
- Hindered traffic due to water depth
- Water reaching top of sidewalk
- Ponding in backyard
- Rainfall heavy enough to trigger local trouble spots
- How quickly did the situation develop?







Nancy Rollins



Monte Rollins



Diane Dorsey





Susan White



Laura Corona







Superstition Fire and Medical

Weather Hazards to Report

Low Visibility

- Dust Storms
 - Report when visibility below 1 mile or less



Mike Olbinski



Dann Niegocki



Kelly Presnell – AZ Daily Star

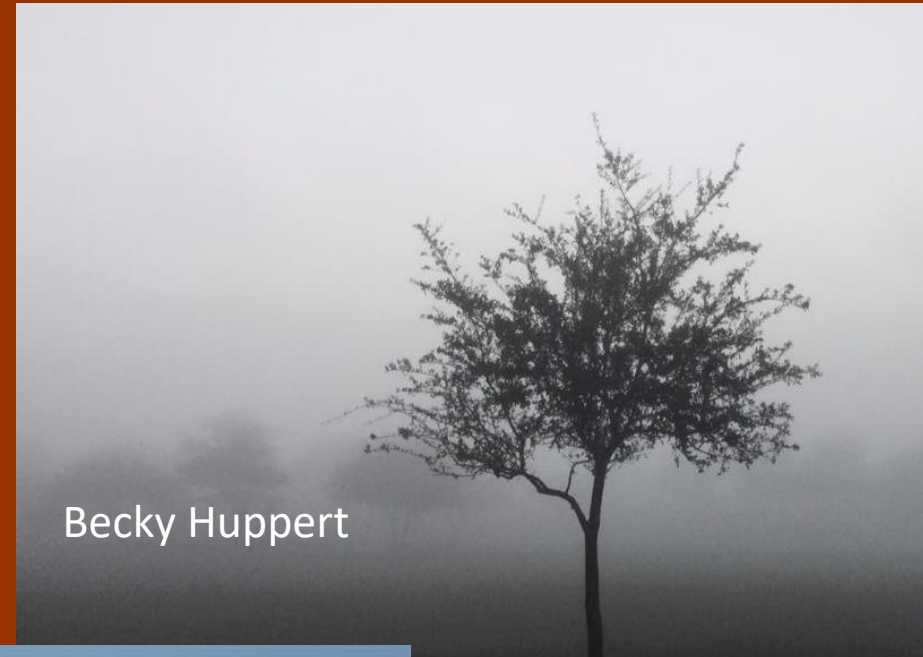


Trey Greenwood

Weather Hazards to Report

Low Visibility

- Fog
 - Report when visibility is below 1 mile



Becky Huppert



Weather Hazards to Report

- Wind Damage

- From any natural cause - thunderstorms, cold fronts, etc.
- Examples: tree limbs snapped, whole trees down, roof materials damaged, patio furniture blown from yard.
- **Always report wind related damage!**



Weather Hazards to Report

- **Microburst Signature**
 - look for toe/foot/curl formation at the surface below the cloud level.
 - can be hard to see with buildings, objects in the way



Kris Masterson

Weather Hazards to Report

- Hail
 - report any sized hail
 - 1 inch (Quarter dollar) or greater requires severe thunderstorm warning



10/5/2010

Tom Hormann



10/5/2010

Tracy Randall



Hail Sizes

Household comparisons

- $\frac{1}{4}$ " = pea
- $\frac{1}{2}$ " = moth ball
- $\frac{3}{4}$ " = penny/dime
- 1" = quarter
- $1 \frac{3}{4}$ " = golf ball
- $2 \frac{3}{4}$ " = baseball
- 4" = grapefruit
- $4 \frac{1}{2}$ " = softball



Weather Hazards to Report

- Snow/Ice
 - even if it is not accumulating
 - take multiple samples of snow depth if possible
 - let us know about road conditions





Reporting Procedures

Criteria

- Tornado
- Storm Damage
- Flooding
- Funnel Cloud
- Rotating Wall Cloud
- Low Visibility **less than 1 mile (Dust/Sand, Fog)**
- Heavy Rain **measured ½ inch or more in 30 min. or less**
- Hail
- Microburst **visually confirmed toe/foot/curl**
- Snow
- Only report conditions meeting criteria





Reporting Procedures

Content Essentials

- Who? (spotter id)
- What? (damage, flooding, low visibility., etc.)
 - damage: trunk/limb diameter? roof material type?
 - flooding: streets? washes? depth? ponding vs. flowing?
 - Low vis: how low (distance)? how widespread?
- Where? (at home? elsewhere? city, major cross-streets)
- When? (time reportable criteria first began)
- Only report information you can confirm





Reporting Methods



- Email psr.spotters@noaa.gov
- Radio SKYWARN Net
- Telephone 1-800-697-0655
- Twitter @NWSPhoenix (hashtags #azwx #cawx)
- Web (?) (small possibility before Monsoon)



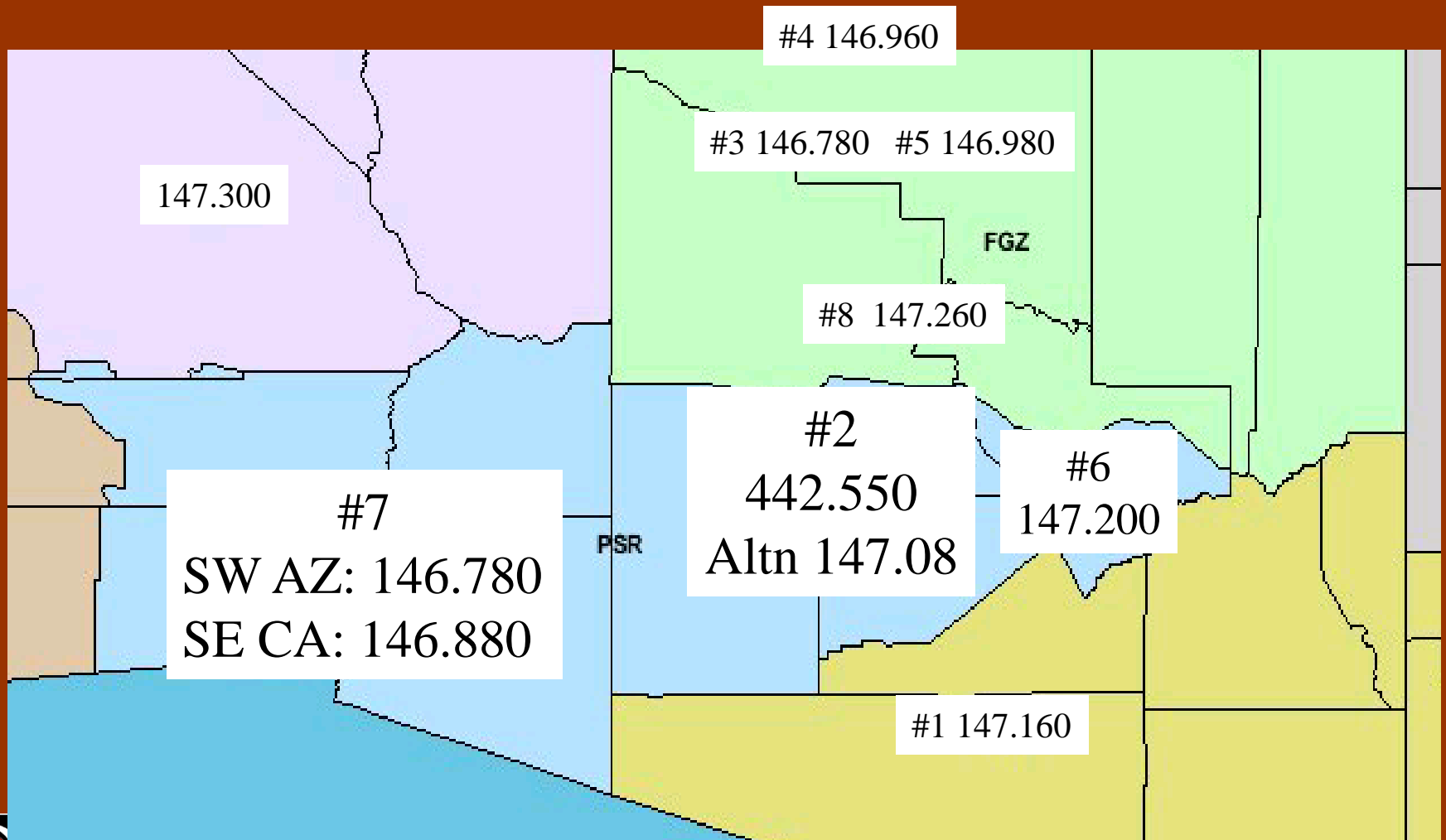


Reporting by Amateur Radio

- Spotters may relay their reports by means of ham radio when a Skywarn Net is activated by NWS
- Reports are handled by designated Net Controller
- Net activation is often on short notice and geared toward larger scale severe events



Amateur Radio Net Sectors





Radio Reports

Net Protocol - Basics

- Monitor the frequency for your area.
- Net Controller announces Skywarn Net activation.
- Use common radio etiquette to relay your report to the Net Controller – be prepared to provide your Spotter ID (in addition to your call sign).
- Remember the reporting criteria.
- Be brief and to the point – no chit-chat!
- Remember, don't wait for the Net if you already have something to report – use one of the other methods (phone, email, web form).





Weekly Routine Skywarn Net



- Sector 2 (Phoenix area)
 - Wednesdays at 8 pm
 - 442.550 MHz (PL tone 100.0)
- Sector 6 (Globe/far east valley)
 - Tuesdays at 8 pm
 - 147.200 MHz (PL tone 162.2)
- Sector 7 (Yuma)
 - Tuesdays at 7 pm
 - 146.780 MHz (PL Tone 103.5)

Ham Radio Contacts: Ken.Waters@noaa.gov - N4PBY

Marvin.Percha@noaa.gov – KI7BLU





Reporting Procedures

In a Nutshell...

- When you encounter something that meets criteria... Report it!
- For HAMs, don't wait for radio Net to be activated.
- Tip: create a Contact in your phone that has your Spotter ID number, the reporting email, and the reporting hotline number.





Before You Begin Storm Spotting



- Safety first and foremost.
- Observing and reporting during severe weather is best done from within safe shelter.
- If you go into the field (at your own risk), always have an escape route and shelter location available
 - observe from a safe distance.
 - avoid taking video while driving (akin to texting while driving) – find a good spot to pull over.



Lightning Safety

‘When thunder roars, go indoors!’

- If Caught Outside
 - Seek shelter immediately! If a building is not available, get inside a metal-topped car.
 - Do not seek shelter near trees or isolated tall objects.
- If indoors
 - Do not take shower or bath (pipes conduct electricity).
 - Avoid corded telephone and electric appliances.
- Wait for 30 minutes after hearing the last thunder before leaving shelter





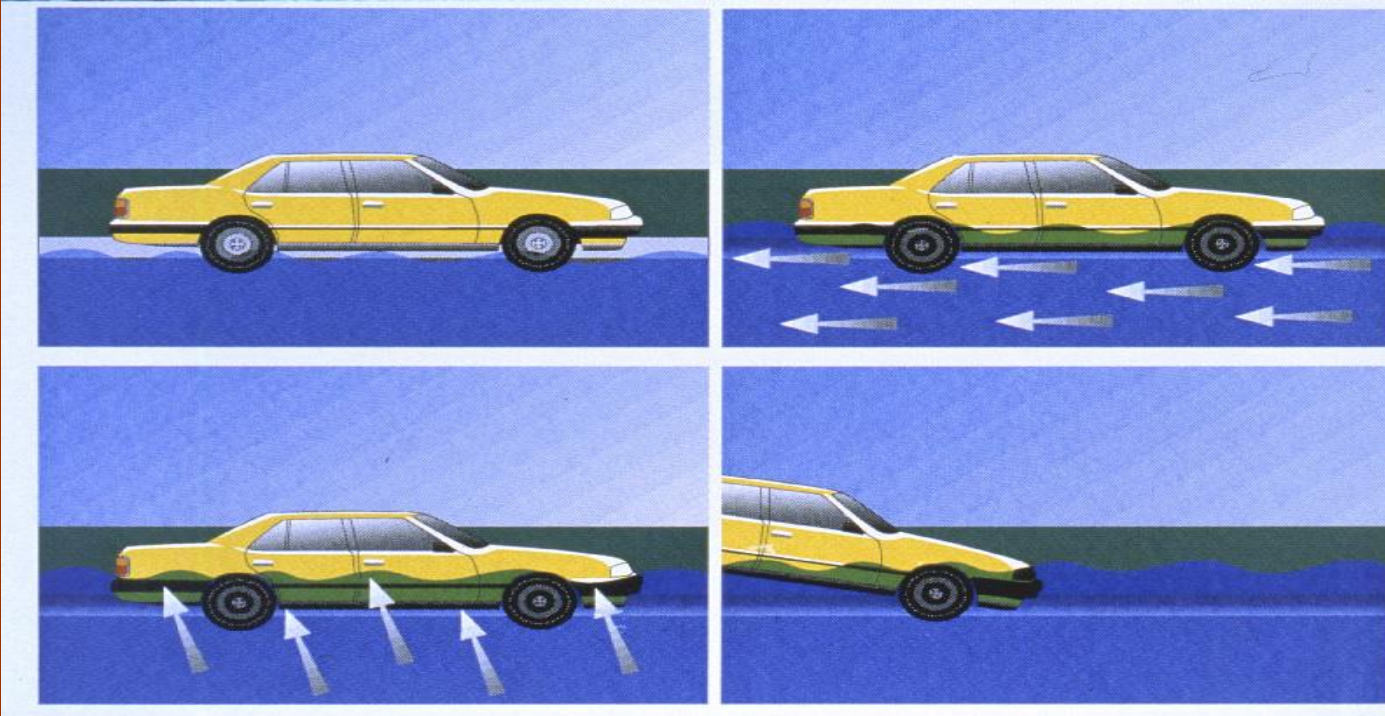
Flood Safety



- Never cross through running water covering a roadway!
- If water covering roadway is muddy, *water depth and road conditions will be hard to determine* – especially at night. Find an alternate route.
- Slow down! Water filled roadway dips can cause hydroplaning.
- If water levels are up to a bridge, do not cross it because it may be damaged and unable to support the weight of your vehicle.



A foot or two of water can cost your life!



- Two feet of running water can pick up and carry most vehicles (including trucks and SUVs).
- Never underestimate the incredible power and force of fast moving water.
- Each foot of water rise up a vehicle results in momentum and buoyancy forces equaling 2000 pounds!
- If your vehicle stalls in high water, Leave It! Seek higher ground.



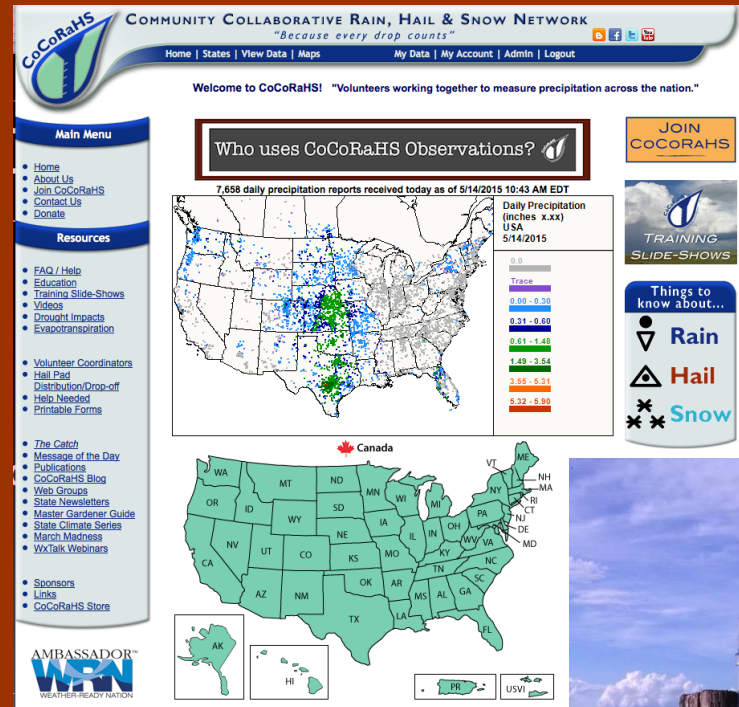
Dust Safety



Pull Aside, Stay Alive



Special Rainfall Reporting System



www.cocorahs.org

Volunteers take their readings once a day



Observers can easily transmit their observations using mobile devices

Verizon 2:23 PM 87%

Logout Precip Report Details

CoCoRaHS CO-LR-610
Fort Collins 3.5 SW

Precipitation Report

Observation Date 2015-05-13

Observation Time 07:00

Rain/Melted Snow 0.00

☐ Trace Precip ☐ More Details

☐ Metric Units (mm/cm)

Submit

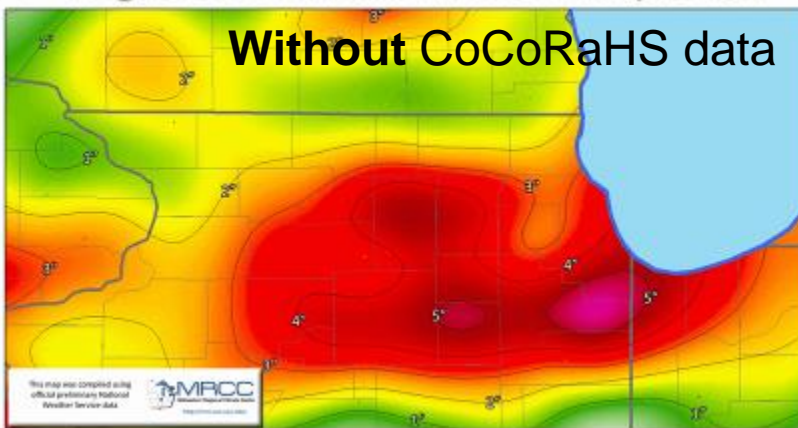
Report History



CoCoRaHS observers help provide a much better post-storm analysis picture!

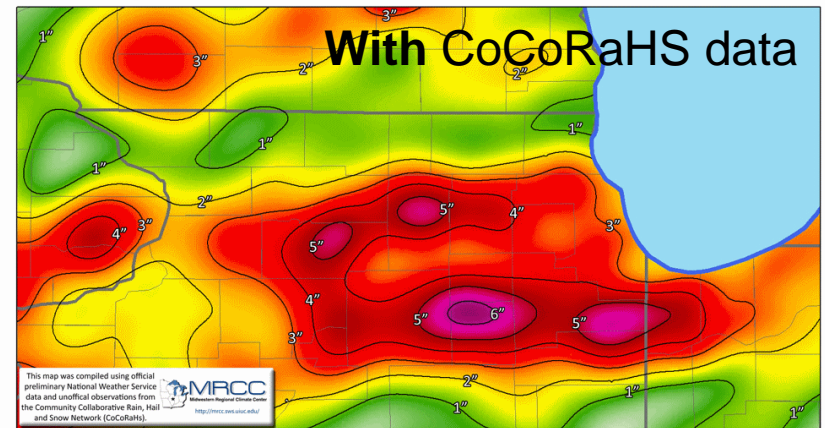
(A) August 23 & 24 Accumulated Precipitation

Without CoCoRaHS data



(B) August 23 & 24 Accumulated Precipitation

With CoCoRaHS data



HOW CAN I JOIN THE NETWORK?



Five easy steps

*Simply sign-up on the
CoCoRaHS web page:
www.cocorahs.org*

Obtain a 4" plastic rain gauge

*View the on-line "training slide show"
or attend a training session*

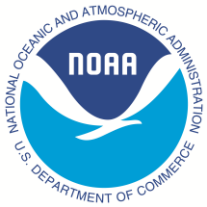
*Set-up the gauge in a "good"
location in your yard*

*Start observing precipitation
and report on-line daily*

CoCoRaHS Contacts

- Nancy Selover - all of AZ
(selover@asu.edu)
- Mark O'Malley
(mark.omalley@noaa.gov)
- Ken Waters – far southeast CA
(ken.waters@noaa.gov)

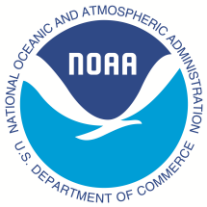




You Make the Call

Rotating Wall Cloud





You Make The Call

Gustnado



Trey Greenwood





You Make the Call

Shelf Cloud – elongated; choppy cloud base



Trey Greenwood





You Make The Call



Tornado – Debris (beneath funnel) confirms ground circulation



Video: Tim Marshall



Summary



- Stay informed
 - weather.gov/phoenix, Twitter, Facebook, Wx Radio
- Reporting Methods
 - Email: psr.spotters@noaa.gov
 - Phone: [1-800-697-0655](tel:1-800-697-0655)
 - Ham radio (when Skywarn Net is activated)
 - Twitter [@NWSPhoenix](https://twitter.com/NWSPhoenix)
- Only report conditions meeting criteria
- First-hand information only, please
- Safety must ALWAYS be the top priority!





Parting Comments



- To stay current, Spotters need to attend a refresher class once every two years.
- Report anytime to your National Weather Service - We're Always Available
- We might call YOU during a storm!
- Please email us your digital pictures AFTER you submit your report.
- Like us on Facebook and follow us on Twitter!





Working Together to Protect Lives and Property

Contact Us

weather.gov/phoenix

602-275-7418

Ken Waters

Warning Coordination Meteorologist

ken.waters@noaa.gov

Austin Jamison

Spotter Focal Point

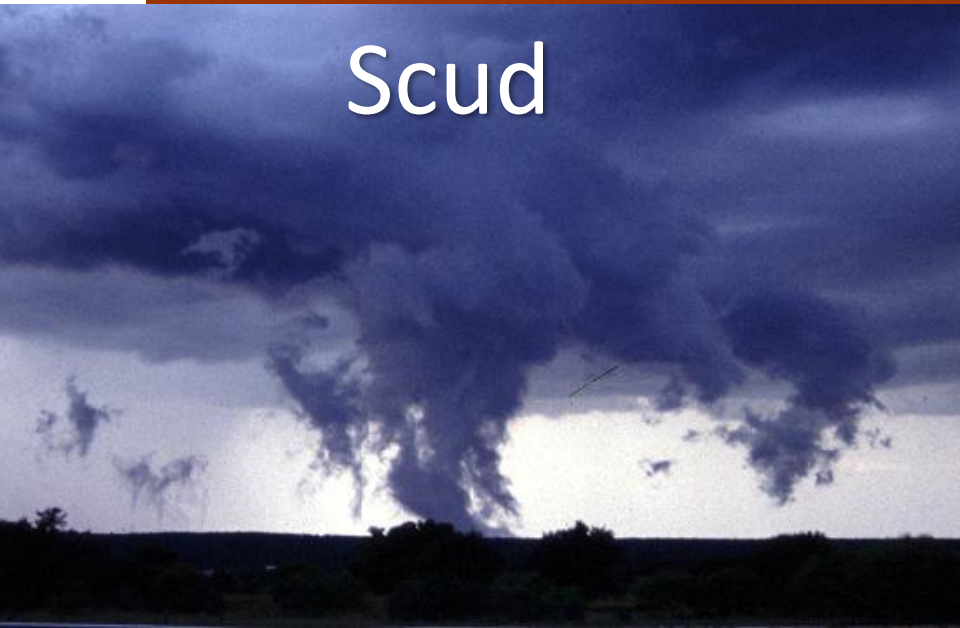
austin.jamison@noaa.gov







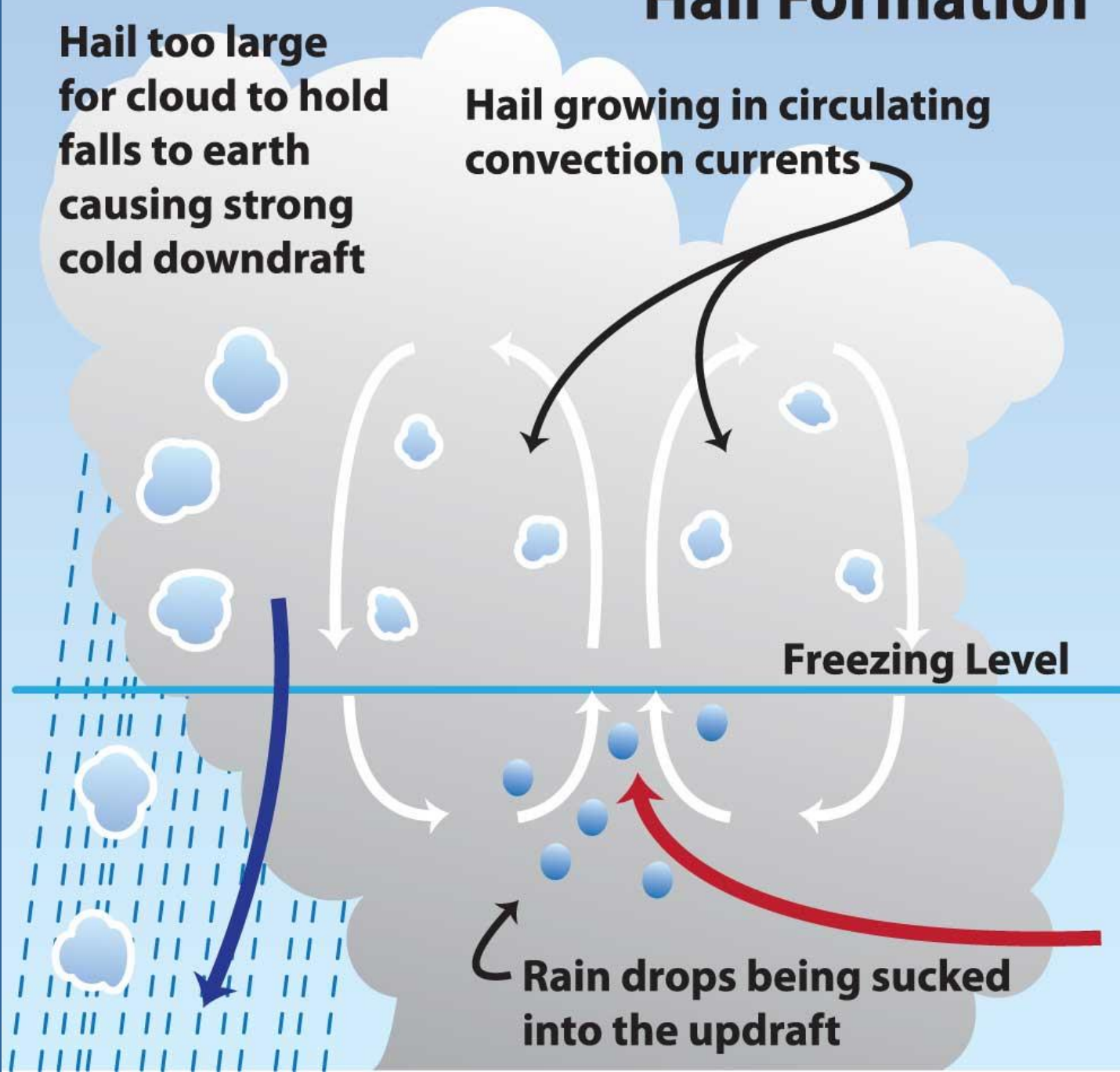
Scud



Hail Formation

**Hail too large
for cloud to hold
falls to earth
causing strong
cold downdraft**

**Hail growing in circulating
convection currents**



Freezing Level

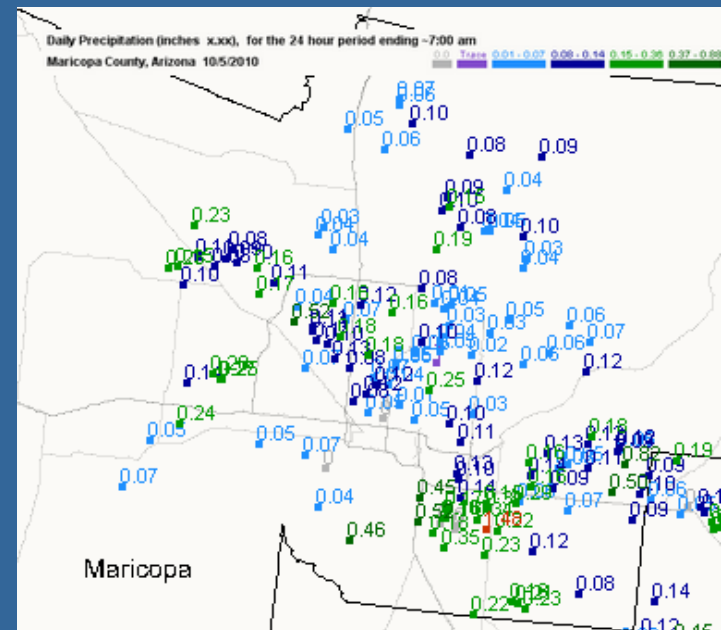
**Rain drops being sucked
into the updraft**

Hail/Graupel/Snow Pellets/Ice Pellets

- Hail
 - Precipitation in the form of balls or irregular lumps of ice with diameters > 5mm; always produced by convective clouds.
 - Hailstones grow by accretion of supercooled water drops and sometimes also by accretion of minor amounts of small ice particles.
- Graupel
 - Essentially small hail ($\leq 5\text{mm}$ diameter).
 - Also known as snow pellets.
- Ice Pellets
 - 1) sleet: freezing of rain drops or refreezing of mostly melted snowflakes
 - 2) snow pellets with an added layer of ice (from accretion or melting of the snow pellet).

Interested in reporting routine conditions?

- CoCoRaHS
- website for once a day reporting of precipitation – rain or shine
- www.cocorahs.org
- contact **Nancy Selover** (selover@asu.edu) or **Mark O'Malley** (mark.omalley@noaa.gov) for more information





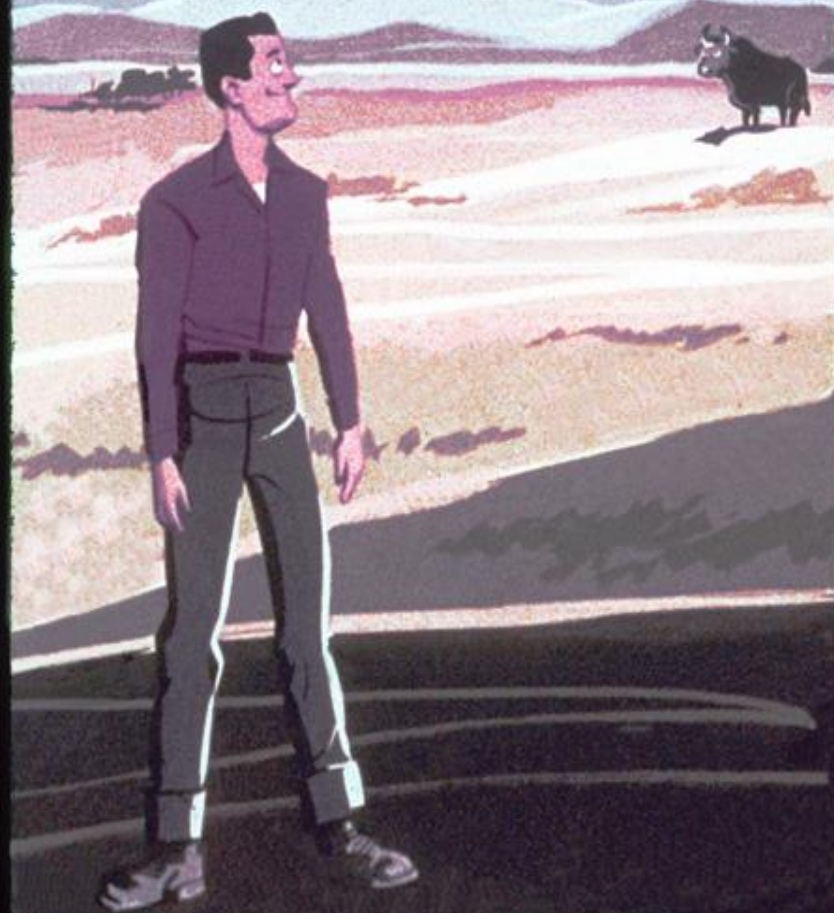
Funnel Cloud or Tornado?

Neither! Steam cloud from power plant



Ken Waters

W A T C H



W A R N I N G



Mammatus Clouds



Suggest turbulence, possibly associated with strong updraft

Very Low Cumulonimbus Mammatus
These are not funnel clouds!